

# Request Request Request Request Request Request



## PCI-SIG ENGINEERING CHANGE REQUEST

<b>TITLE:</b>	x4 Drawing ECR Rev1.35
<b>DATE:</b>	June 21, 2018
<b>AFFECTED DOCUMENT:</b>	OCuLink 1.0
<b>SPONSOR:</b>	Ed Poh (Molex), Alex Haser (Molex), Jay Neer (Molex)

### Part I:

#### 1. Summary of the Functional Changes

The drawings included in OCuLink ~~1.0~~ showed SMT hold downs on the fixed side. For durability, the industry prefers through-hole hold downs. This ECR replaces the drawings with ones that show the preferred board-attach. Hold-down features and footprints have been removed from the normative part of this Specification (~~examples are to be included in a separate appendix ECR~~). Additionally, several dimensions and tolerances have been corrected based on input from workgroup members.

#### 2. Benefits as a Result of the Changes

The OCuLink ~~1.0~~ specification now shows drawings for parts preferred by the industry. Updated dimensions and tolerances ensure intermateability between components made by different manufacturers. Users are able to choose their preferred board-attach method.

#### 3. Assessment of the Impact

Drawings and dimensions for the x4 form factor have been corrected and clarified.

#### 4. Analysis of the Hardware Implications

Updating the dimensions and tolerances as well as clarifying figures will enable more effective manufacturing of the components and assemblies.

#### 5. Analysis of the Software Implications

None, this change does not affect software.

### Part II:

Content shown on subsequent, odd-numbered pages contain the changes dictated by this ECR. Sections of text, figures and tables that have not been included are unaffected by this ECR.

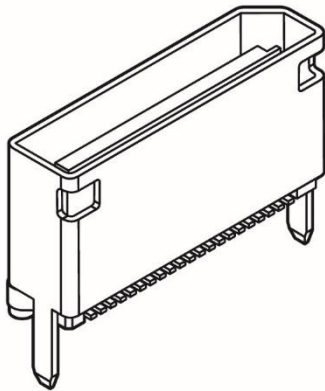
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[Editor's](#) *Note: This document is intended to be viewed showing two pages side-by-side. The original drawings from OCuLink 1.0 are on the odd numbered pages (left). The new drawings are on the even numbered pages (right).*

## 4. x4 Fixed Host Board-side Connectors

- The x4 Fixed Host Board-side Connectors (see Figure 4-1 and Figure 4-5) are 42-contact SMT connectors with metal shells for robustness and for latching and are used for both external and internal applications.
- The x4 Free Cable connector, defined in Chapter 5 of this Specification, mates to the two Host Board-side connectors, defined in this section.
- The connectors accept both active and passive cable latching solutions, defined in Chapter 6 of this Specification.
- The connector shells are attached to the Fixed boards, by either intrusive reflow or SMT.

### 4.1. x4 Fixed Host Board-side Vertical Connector



**Figure 4-1. Isometric View of the x4 Fixed Host Board-side Vertical Connector**

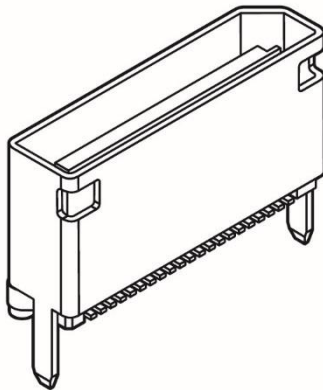
## 4. x4 Fixed Host Board-side Connectors

The x4 fixed host board-side connector are available in vertical (see Figure 4-1) and right-angle (see Figure 4-6) configurations. Both configurations:

- ☐ Contain 42 SMT circuits enclosed in a metal shell, which provide robustness and latch points for mating with free cable assemblies. These shells are attached to fixed boards either by intrusive reflow or SMT.
- ☐ Conform to their respective form factors defined in this Chapter.
- ☐ May be used in both internal and external applications.
- ☐ Mate to the x4 free cable-side connector, defined in Chapter 5 of this Specification.
- ☐ Accept both active and passive cable latching solutions, which are defined in Chapter 6 of this Specification.
- ☐ Follow the pin assignments and contact sequencing defined in Tables 3-1, 3-2 and 3-3.

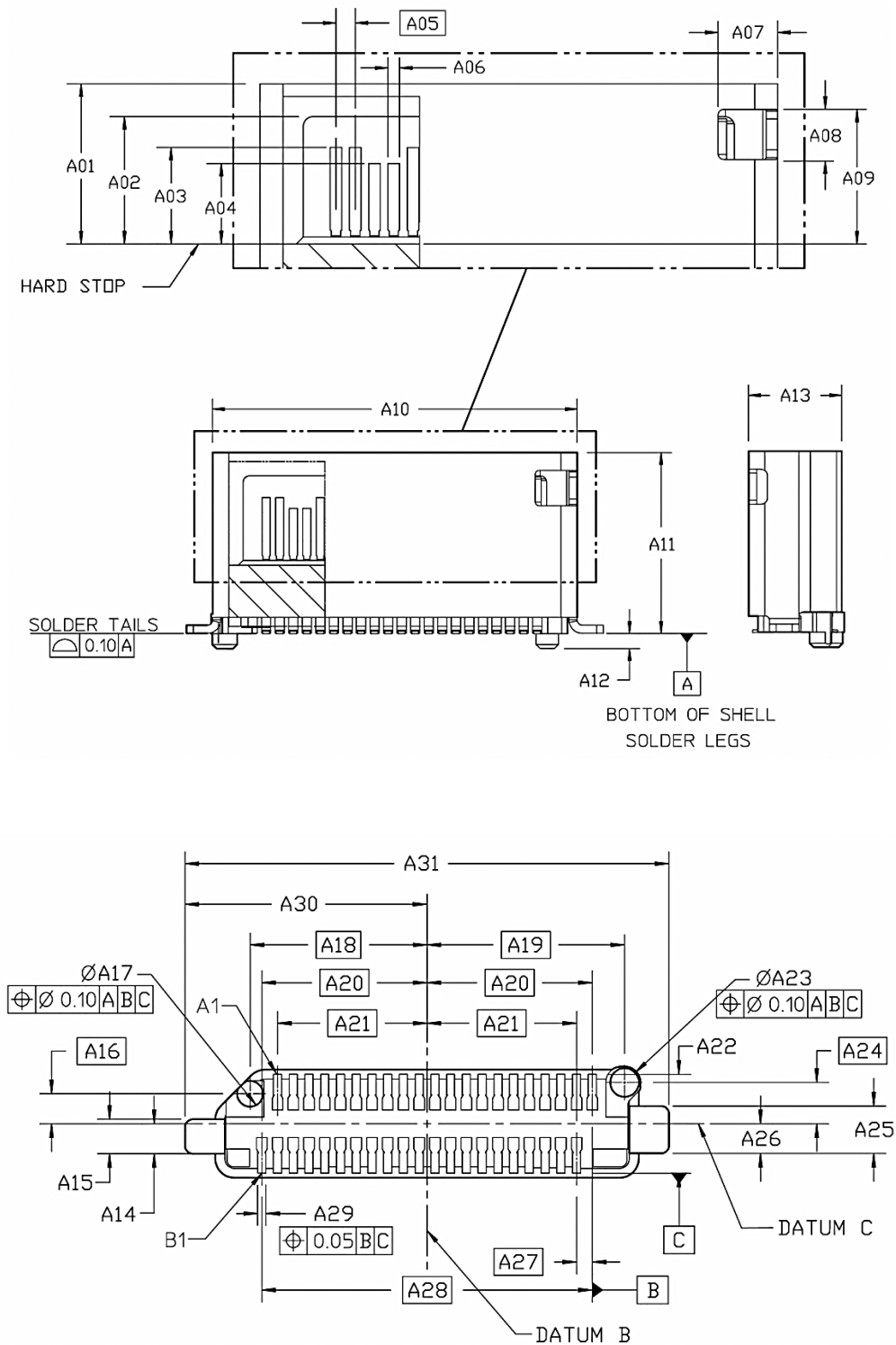
*[EDITORS NOTE: Some of these bullet points were moved from Chapter 6.]*

### 4.1. x4 Fixed Host Board-side Vertical Connector



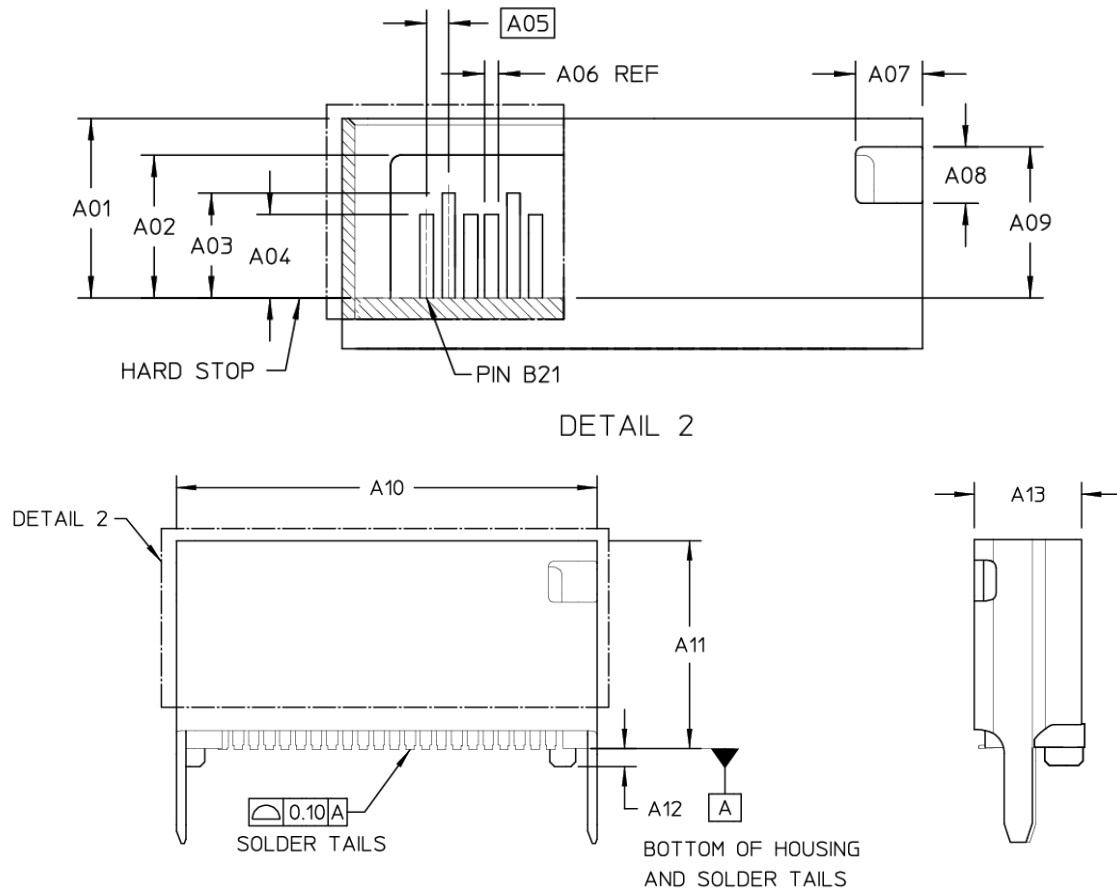
**Figure 4-1. x4 Fixed Host Board-side Vertical Connector**

## 4.2. x4 Fixed Host Board-side Vertical Connector



**Figure 4-2. x4 Fixed Host Board-side Vertical Connector Form Factor Dimensions**

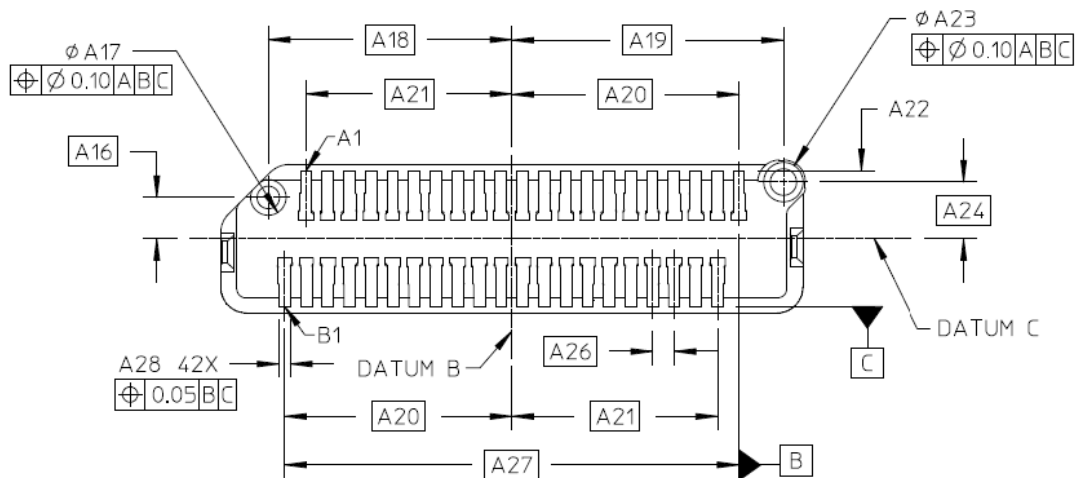
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**Figure 4-2. x4 Fixed Host Board-side Vertical Form Factor**

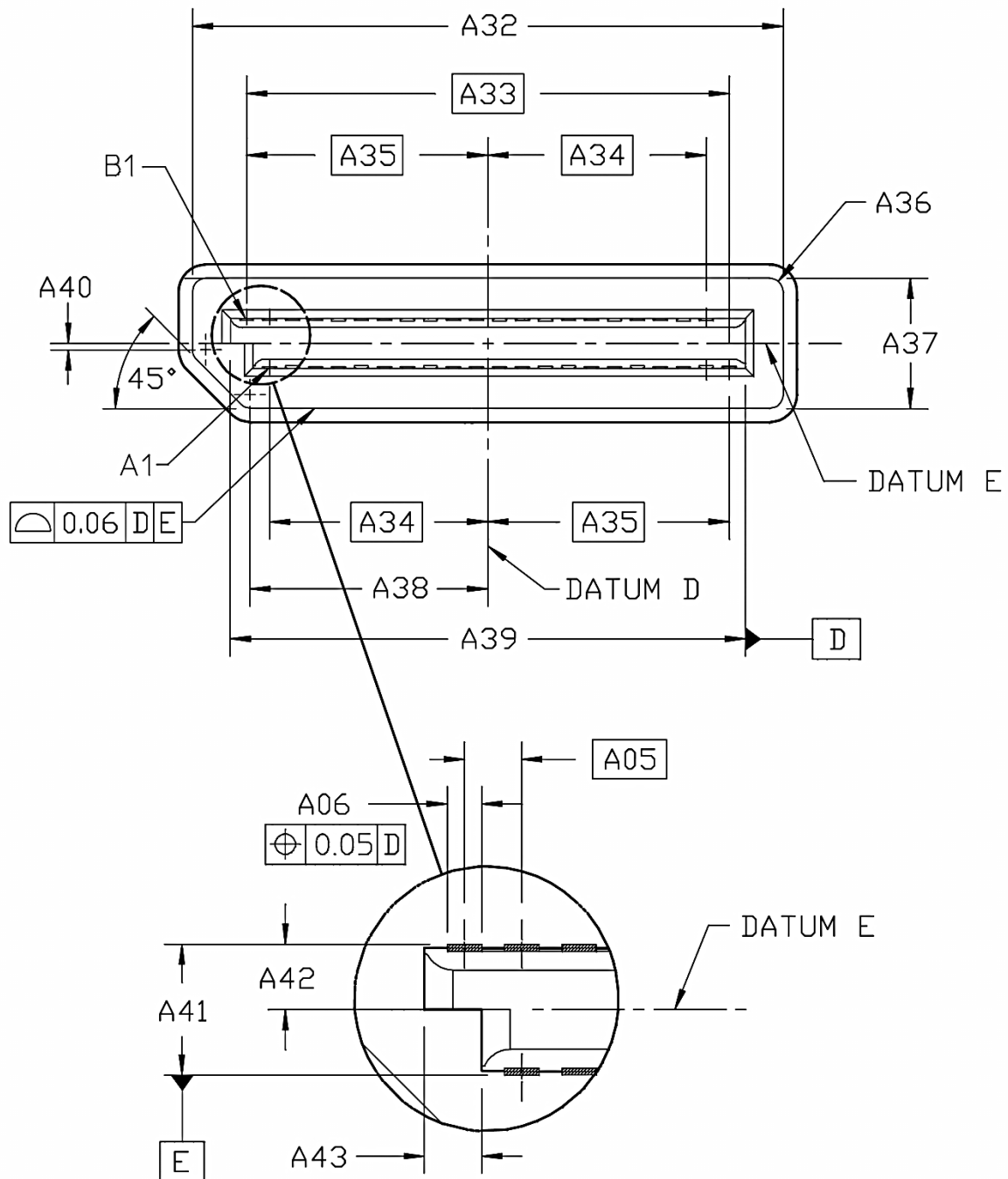


**Note:** Refer to Chapter 3 for connector pinouts and contact sequencing. [Additional features such as chamfers and fillets may be added as desired so long as they do not prevent free cable-side connectors from contacting the surface denoted “hard stop” when mated. To ensure interchangeability, designers must assume no additional lead-in features are included on the free cable-side connector.](#)



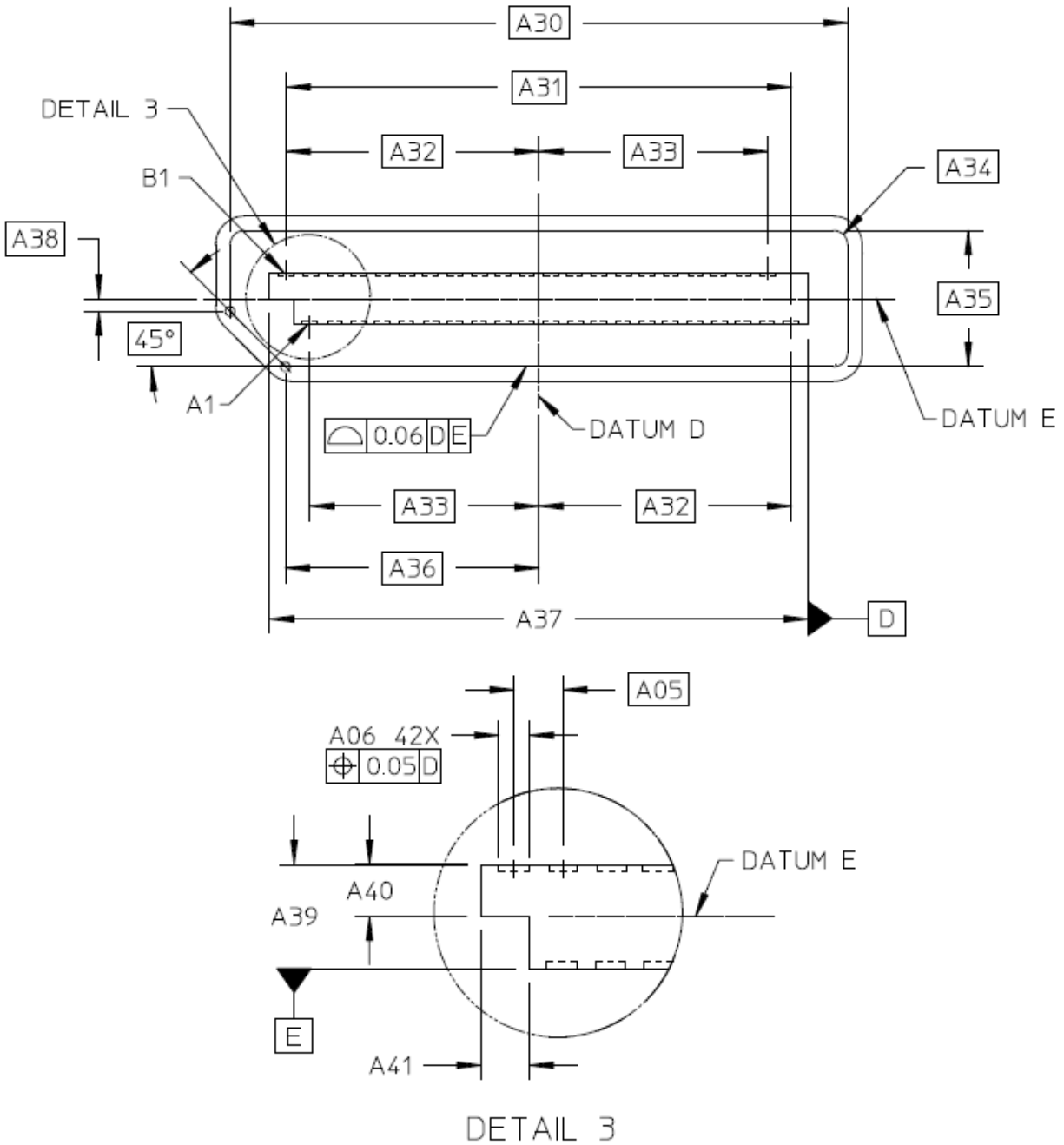
**Figure 4-3. Bottom View of x4 Fixed Host Board-side Vertical Form Factor**

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**Figure 4-3. Mating Interface Dimensions for all x4 Fixed Host Board-side Connectors**

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**Figure 4-4. x4 Fixed Host Board-side Form Factor Mating Interface**



**Note:** This mating interface applies to all x4 fixed host board-side connectors.



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**Table 4-1. x4 Fixed Host Board-side Vertical Connector Dimensions**

ID	Description	Dimension	Tolerance $\pm$
<b>Figure 4-2</b>			
A01	Hard stop to front of shell	4.15	0.08
A02	Hard stop to interface paddle nose	3.30	0.03
A03	Hard stop to 1st mate contacts	2.42	0.12
A04	Hard stop to 2nd mate contacts	1.95	0.12
A05	Fixed connector contact beam pitch - Typical	0.50	Basic
A06	Fixed connector contact width - Typical	0.30	0.03
A07	Latch window width (2X)	1.55	0.08
A08	Latch window length (2X)	1.30	0.08
A09	Hard stop (housing) to latch point (shell) (2x)	3.49	0.11
A10	Connector (shell) overall length	13.45	Ref
A11	Connector (shell) overall height from bottom of shell solder legs (Datum A)	6.66	0.08
A12	Locating peg length (2X)	0.56	0.10
A13	Connector (shell) overall width	3.43	Ref
A14	Horizontal centerline (CL) of solder tail array (Datum C) to edge of small (left) solder leg of shell	0.95	0.19
A15	Small (left) solder leg (shell) width	1.09	0.10
A16	Horizontal CL of solder tail array (Datum C) to CL of inboard (left) locating peg (orientation feature end)	0.95	Basic
A17	Small (left) locating peg diameter	0.82	+0.03/- 0.15
A18	Vertical CL of solder tail array (Datum B) to CL of inboard (left) locating peg	5.62	Basic
A19	Vertical CL of solder tail array (Datum B) to CL of outboard (right) locating peg	6.28	Basic
A20	Vertical CL of solder tail array (Datum B) to CL of outside solder tails (long offset from Datum B) (2X)	5.25	Basic
A21	Vertical CL of solder tail array (Datum B) to CL of inside solder tails (short offset from Datum B) (2X)	4.75	Basic
A22	Edge of Row A solder tail contacts to edge of Row B Solder Tail Contacts. (Datum C)	3.14	0.16
A23	Large (right) locating peg diameter	0.97	+0.03/-0.15
A24	Horizontal CL of Solder Tail Array (Datum C) to CL of outboard/ large locating peg	1.31	Basic
A25	Large Solder Leg (Shell) width	1.50	0.10

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**Table 4-1. Dimensions for x4 Fixed Host Board-side Vertical Form Factors**

ID	Description	Dimension	Tolerance $\pm$
A01	Hard stop to front of shell	4.15	0.08
A02	Hard stop to interface paddle nose	3.30	0.03
A03	Hard stop to 1st mate contacts	2.42	0.12
A04	Hard stop to 2nd mate contacts	2.00	0.12
A05	Fixed connector contact beam pitch - Typical	0.50	Basic
A06	Fixed connector contact width - Typical	0.30	Ref
A07	Latch window width (2X)	1.55	0.08
A08	Latch window length (2X)	1.30	0.08
A09	Hard stop (housing) to latch point (shell) (2x)	3.60	0.11
A10	Connector overall length	13.45	Ref
A11	Connector overall height from bottom of housing surface (Datum A) to top surface of shell	6.66	0.08
A12	Locating peg length (2X)	0.56	0.10
A13	Connector overall width	3.43	Ref
A14	REMOVED FROM DRAWING		
A15	REMOVED FROM DRAWING		
A16	Horizontal CL of solder tail array (Datum C) to CL of left locating peg	0.95	Basic
A17	Left locating peg diameter	0.85	MAX
A18	Vertical CL of solder tail array (Datum B) to CL of left locating peg	5.62	Basic
A19	Vertical CL of solder tail array (Datum B) to CL of right locating peg	6.28	Basic
A20	Vertical CL of solder tail array (Datum B) to CL of outside solder tails (long offset from Datum B) (2X)	5.25	Basic
A21	Vertical CL of solder tail array (Datum B) to CL of inside solder tails (short offset from Datum B) (2X)	4.75	Basic
A22	Edge of Row A solder tail contacts to edge of Row B Solder Tail contacts (Datum C)	3.14	0.16
A23	Right locating peg diameter	0.85	MAX
A24	Horizontal CL of Solder Tail Array (Datum C) to CL of right locating peg	1.31	Basic
A25	REMOVED FROM DRAWING		

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**Table 4-1. x4 Fixed Host Board-side Vertical Connector Dimensions  
(Continued)**

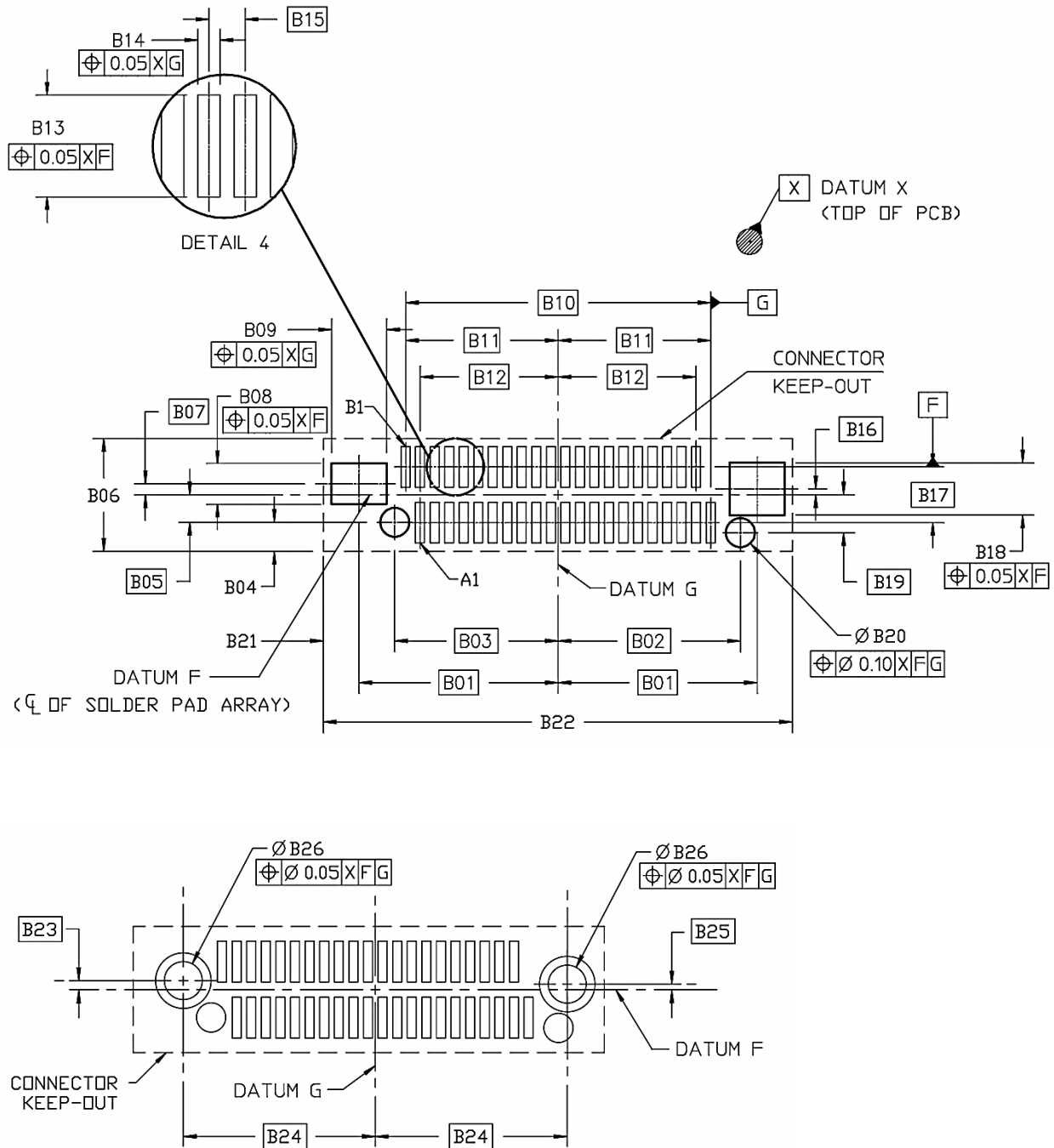
ID	Description	Dimension	Tolerance $\pm$
A26	Horizontal CL of Solder Tail Array (Datum C) to edge large right Solder Leg	0.94	0.19
A27	Solder Tail Contact pitch - Typical	0.50	Basic
A28	Outer solder tails CL to CL (lower left B1 to upper right A21) (Datum B)	10.50	Basic
A29	Solder tail width (solder pad contact area) - Typical	0.26	0.03
A30	Datum B to end of left solder leg of shell	7.69	0.05
A31	Length from end of left to end of right solder legs	15.38	0.10
<b>Figure 4-3</b>			
A32	Interface (inside shell) cavity width	12.85	0.03
A33	Outer contacts CL to CL (upper left B1 to lower right A21)	10.50	Basic
A34	Vertical CL of interface paddle length (Datum D) to CL inner terminals (2x) (short offset from Datum D)	4.75	Basic
A35	Vertical CL of interface paddle length (Datum D) to CL outer terminals (2x) (long offset from Datum D)	5.25	Basic
A36	Inside radius of Fixed connector Shell (5X)	0.30	0.05
A37	Interface (inside shell) cavity height	2.83	0.04
A38	Vertical CL of interface paddle length (Datum D) to inside shell radius	5.23	0.06
A39	Interface Paddle length	11.20	0.03
A40	Horizontal CL of interface paddle (Datum E) to inside shell radius	0.25	0.09
A44	Interface paddle length minus the orientation feature width	10.70	0.03
A41	Interface paddle thickness (over top of contact beams; plastic/paddle must be below top of contact beams)	1.08	0.06
A42	Orientation feature (on paddle) thickness	0.54	0.03
A43	Orientation feature (on paddle) width	0.48	Ref
A05	Fixed connector contact pitch (Repeated Dimension)	0.50	Basic
A06	Fixed connector contact width (Repeated Dimension)	0.30	0.03

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**Table 4-1. Dimensions for x4 Fixed Host Board-side Vertical Form Factors  
(Continued)**

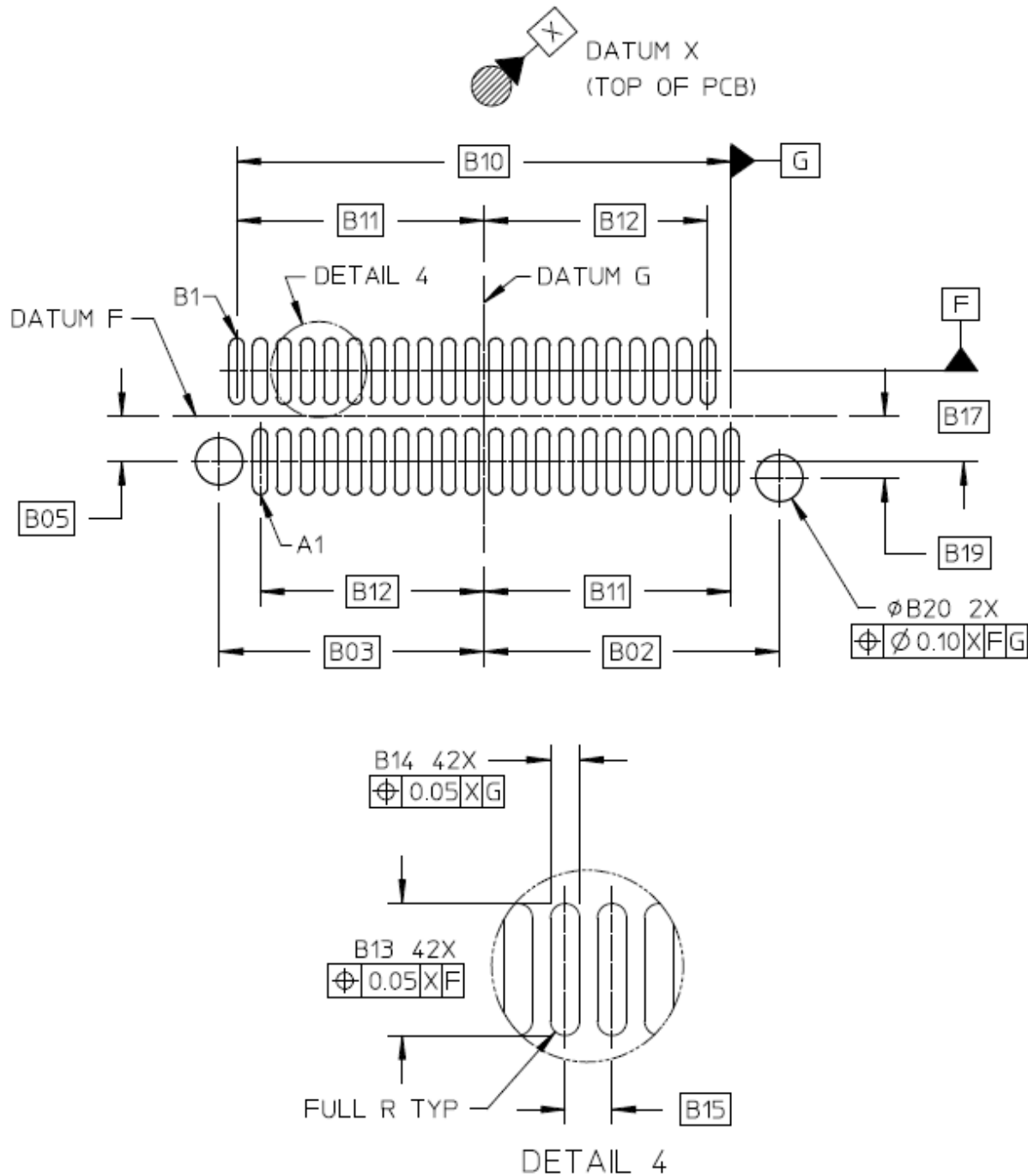
ID	Description	Dimension	Tolerance $\pm$
A26	Solder tail contact pitch - Typical	0.50	Basic
A27	Outer solder tails CL to CL (lower left B1 to upper right A21) (Datum B)	10.50	Basic
A28	Solder tail width- Typical	0.26	0.03
A29	REMOVED FROM DRAWING		
A31	REMOVED FROM DRAWING		
A30	Interface (inside shell) cavity width	12.85	<b>Basic</b>
A31	Outer contacts CL to CL (upper left B1 to lower right A21)	10.50	Basic
A32	Vertical CL of interface paddle length (Datum D) to CL outer terminals (2x) (long offset from Datum D)	<b>5.25</b>	Basic
A33	Vertical CL of interface paddle length (Datum D) to CL inner terminals (2x) (short offset from Datum D)	<b>4.75</b>	Basic
A34	Inner radius of Fixed connector shell (5X)	0.30	<b>Basic</b>
A35	Interface (inside shell) cavity height	2.83	<b>Basic</b>
A36	Vertical CL of interface paddle length (Datum D) to inner sharp corner of shell (TSC)	<b>5.28</b>	<b>Basic</b>
A37	Interface <b>p</b> Paddle length	11.20	0.03
A38	Horizontal CL of interface paddle (Datum E) to inside shell radius	0.25	<b>Basic</b>
A44	REMOVED FROM DRAWING		
A39	Interface paddle thickness (Datum E) -measured over top of contact beams; plastic/paddle must be below top of contact beams	1.08	0.06
A40	Polarizing notch height	0.54	0.03
A41	Polarizing notch width	<b>0.50</b>	<b>MIN</b>
Note: These dimensions apply to Figures 4-2, 4-3 and 4-4.			

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**Figure 4-4. x4 Fixed Host Board-side Vertical Connector Footprint**

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**Figure 4-5. x4 Fixed Host Board-side Vertical Form Factor Normative Footprint Features**



**Note:** Refer to Appendix G for examples of shell hold-downs and keep-out zones.

*(EDITORS NOTE: This appendix is to be added via another ECR.)*

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**Table 4-2. Dimensions for x4 Fixed Host Board-side Vertical Connector Footprint**

ID	Description	Dimension	Tolerance $\pm$
B01	Vertical CL of solder pad array (Datum G) to CL of (shell) solder pads	6.85	Basic
B02	Vertical CL of solder pad array (Datum G) to CL of outboard (right) locating hole	6.28	Basic
B03	Vertical CL of solder pad array (Datum G) to CL of inboard (left) locating hole	5.62	Basic
B04	CL of inboard locating hole to keep-out zone (length)	1.21	0.15
B05	Horizontal CL of solder pad array (Datum F) to CL of inboard (left) locating hole	0.95	Basic
B06	Connector keep-out zone height	4.32	0.15
B07	Horizontal CL of solder pad array (Datum F) to CL of small (left) solder pad	0.37	Basic
B08	Small (shell) solder pad height	1.40	0.10
B09	(Shell) solder pad width (2X)	1.90	0.10
B10	CL to CL of outer solder pads (horizontal)	10.50	Basic
B11	Vertical CL of solder pad array (Datum G) to CL outside solder pads	5.25	Basic
B12	Vertical CL of solder pad array (Datum G) to CL inside solder pads	4.75	Basic
B13	Signal solder pad length (42x)	1.40	0.05
B14	Signal solder pad width (42x)	0.31	0.05
B15	Solder pad pitch	0.50	Basic
B16	Horizontal CL of solder pad array (Datum F) to CL of large solder-pad	0.20	Basic
B17	Horizontal CL (Row A) to CL (Row B) solder pads	1.91	Basic
B18	Large (shell) solder pad height	1.80	0.15
B19	Horizontal CL of solder pad array (Datum F) to CL outboard (right) locating hole	1.31	Basic
B20	Locating hole diameter (2X)	1.00	0.05
B21	CL of inboard (left) locating hole to keep-out zone	2.68	0.15
B22	Connector keep-out zone length	16.60	0.15
B23	Datum F to CL of hole for left shell solder tail hole	0.31	Basic
B24	Datum G to CL of left and right shell solder tails	6.58	Basic
B25	Datum F to CL of right shell solder tail hole	0.19	Basic
B26	Diameter of plated thru holes for shell solder tails	1.30	0.10

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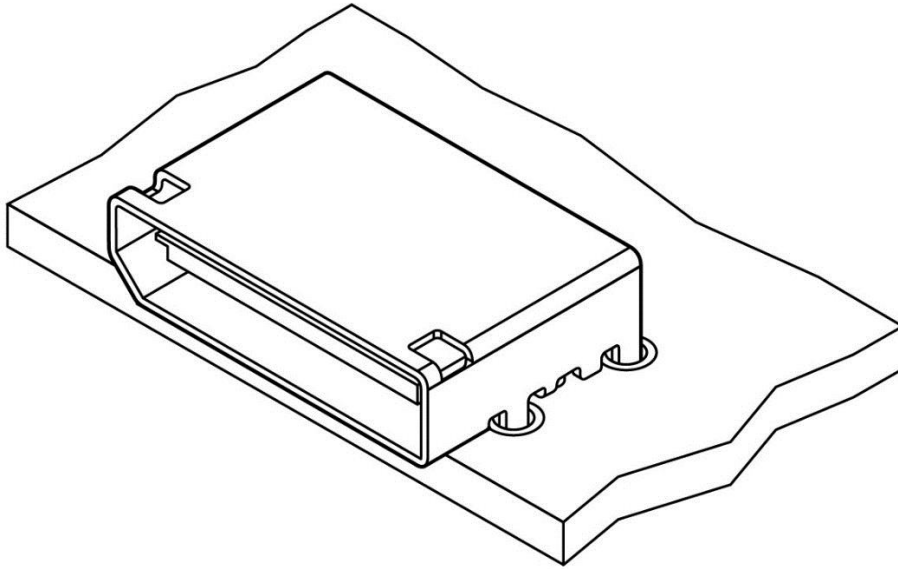
**Table 4-2. Dimensions for x4 Fixed Host Board-side Vertical Form Factor Normative Footprint Features**

ID	Description	Dimension	Tolerance $\pm$
B01	REMOVED FROM DRAWING ( <a href="#">EDITOR'S NOTE: moved to Appendix G; BB06</a> )		
B02	Vertical CL of solder pad array (Datum G) to CL of right locating hole	6.28	Basic
B03	Vertical CL of solder pad array (Datum G) to CL of left locating hole	5.62	Basic
B04	REMOVED FROM DRAWING ( <a href="#">EDITOR'S NOTE: Height of keep- out now split over Datum F (see Appendix G); dimension no longer needed</a> )		
B05	Horizontal CL of solder pad array (Datum F) to CL of left locating hole	0.95	Basic
B06	REMOVED FROM DRAWING ( <a href="#">EDITOR'S NOTE: moved to Appendix G; BB07 (SMT) &amp; BB14 (Thru hole)</a> )		
B07	REMOVED FROM DRAWING ( <a href="#">EDITOR'S NOTE: moved to Appendix G; BB04</a> )		
B08	REMOVED FROM DRAWING ( <a href="#">EDITOR'S NOTE: moved to Appendix G; BB02</a> )		
B09	REMOVED FROM DRAWING ( <a href="#">EDITOR'S NOTE: moved to Appendix G; BB01</a> )		
B10	CL to CL of outer solder pads (Datum G)	10.50	Basic
B11	Vertical CL of solder pad array (Datum G) to CL outside solder pads	5.25	Basic
B12	Vertical CL of solder pad array (Datum G) to CL inside solder pads	4.75	Basic
B13	Solder pad length (42X)	1.40	0.05
B14	Solder pad width (42X)	0.31	0.05
B15	Solder pad pitch	0.50	Basic
B16	REMOVED FROM DRAWING ( <a href="#">EDITOR'S NOTE: moved to Appendix G; BB05</a> )		
B17	Horizontal CL (Row A) to CL (Row B) solder pads	1.91	Basic
B18	REMOVED FROM DRAWING ( <a href="#">EDITOR'S NOTE: moved to Appendix G; BB03</a> )		
B19	Horizontal CL of solder pad array (Datum F) to CL right locating hole	1.31	Basic
B20	Locating hole diameter (2X)	1.00	0.05
B21	REMOVED FROM DRAWING ( <a href="#">EDITOR'S NOTE: Width of keep-out now split over Datum G (see Appendix G); dimension no longer needed</a> )		
B22	REMOVED FROM DRAWING ( <a href="#">EDITOR'S NOTE: moved to Appendix G; BB08 (SMT); BB15 (Thru hole)</a> )		
B23	REMOVED FROM DRAWING ( <a href="#">EDITOR'S NOTE: moved to Appendix G; BB11</a> )		
B24	REMOVED FROM DRAWING ( <a href="#">EDITOR'S NOTE: moved to Appendix G; BB13</a> )		
B25	REMOVED FROM DRAWING ( <a href="#">EDITOR'S NOTE: moved to Appendix G; BB12</a> )		
B26	REMOVED FROM DRAWING ( <a href="#">EDITOR'S NOTE: moved to Appendix G; BB09 &amp; BB10</a> )		



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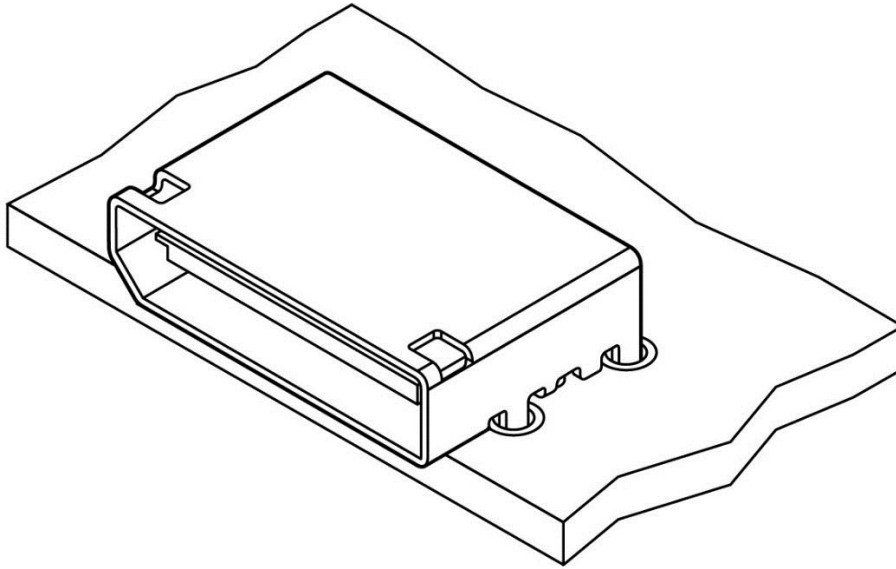
## **4.3 Fixed Host Board-side Right Angle Connector**



**Figure 4-5. Isometric View of the x4 Fixed Host Board-side Right Angle Connector**

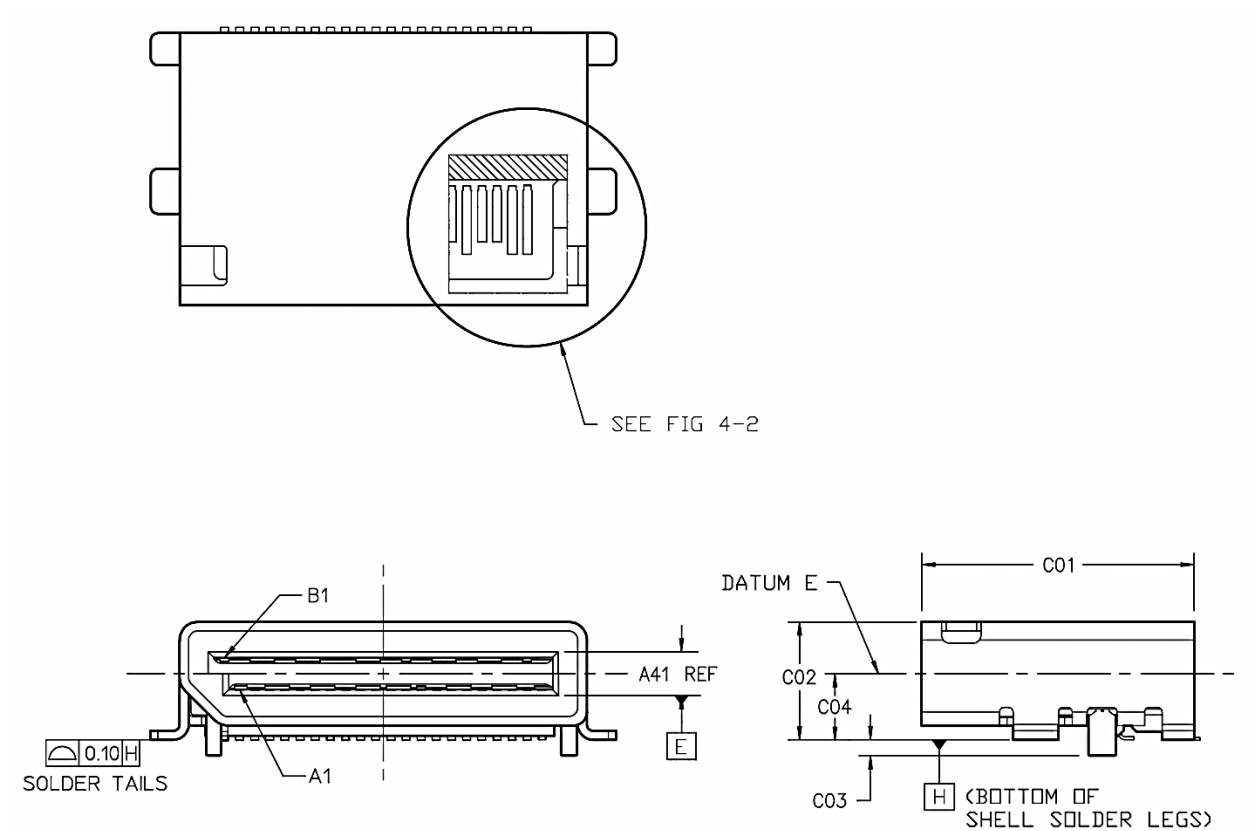
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## **4.2. Fixed Host Board-side Right-angle Connector**



**Figure 4-6. x4 Fixed Host Board-side Right-angle Connector**

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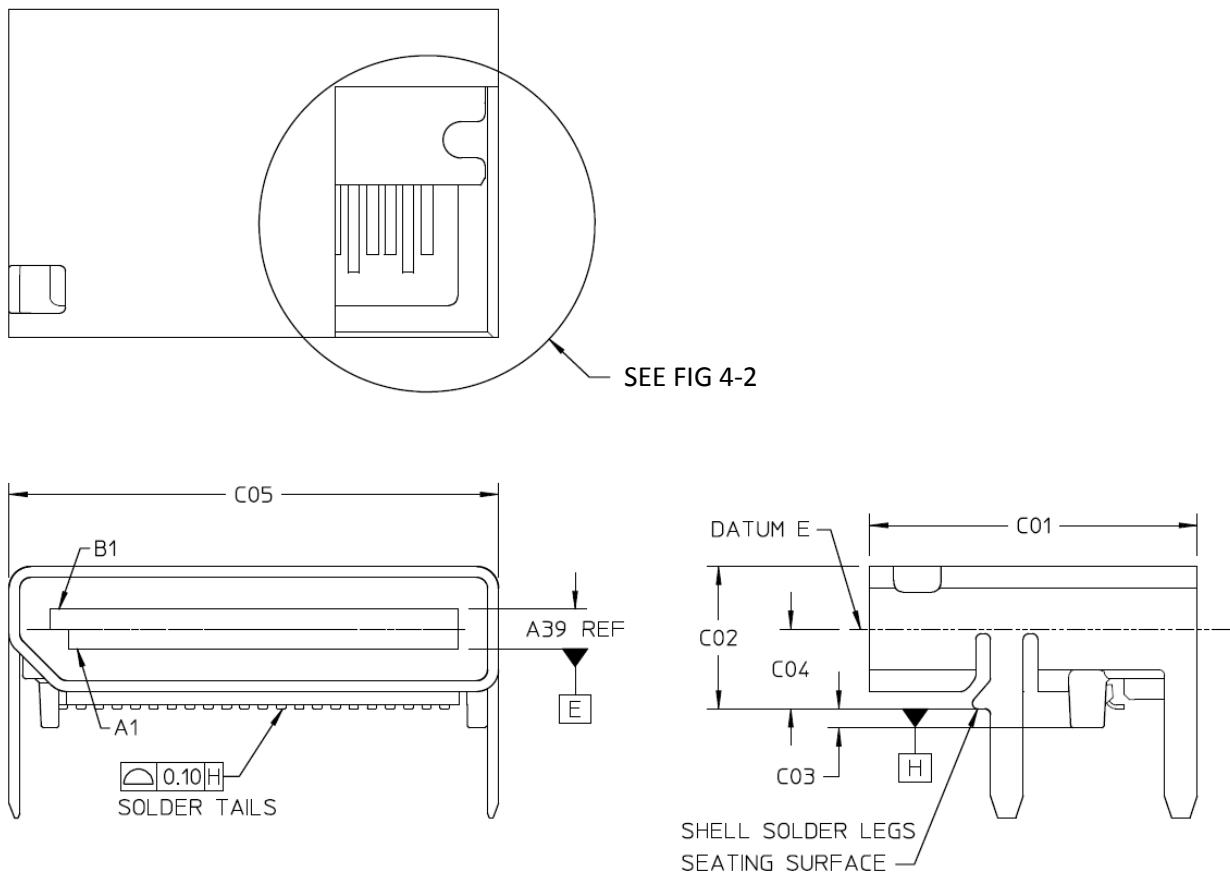


**Figure 4-6. x4 Fixed Host Board-side Right Angle Connector Form Factor**



**Note:** The x4 Fixed Host Board-side Right Angle Connector Mating Interface Dimensions are the same as for the Vertical version (see Figure 4-3).

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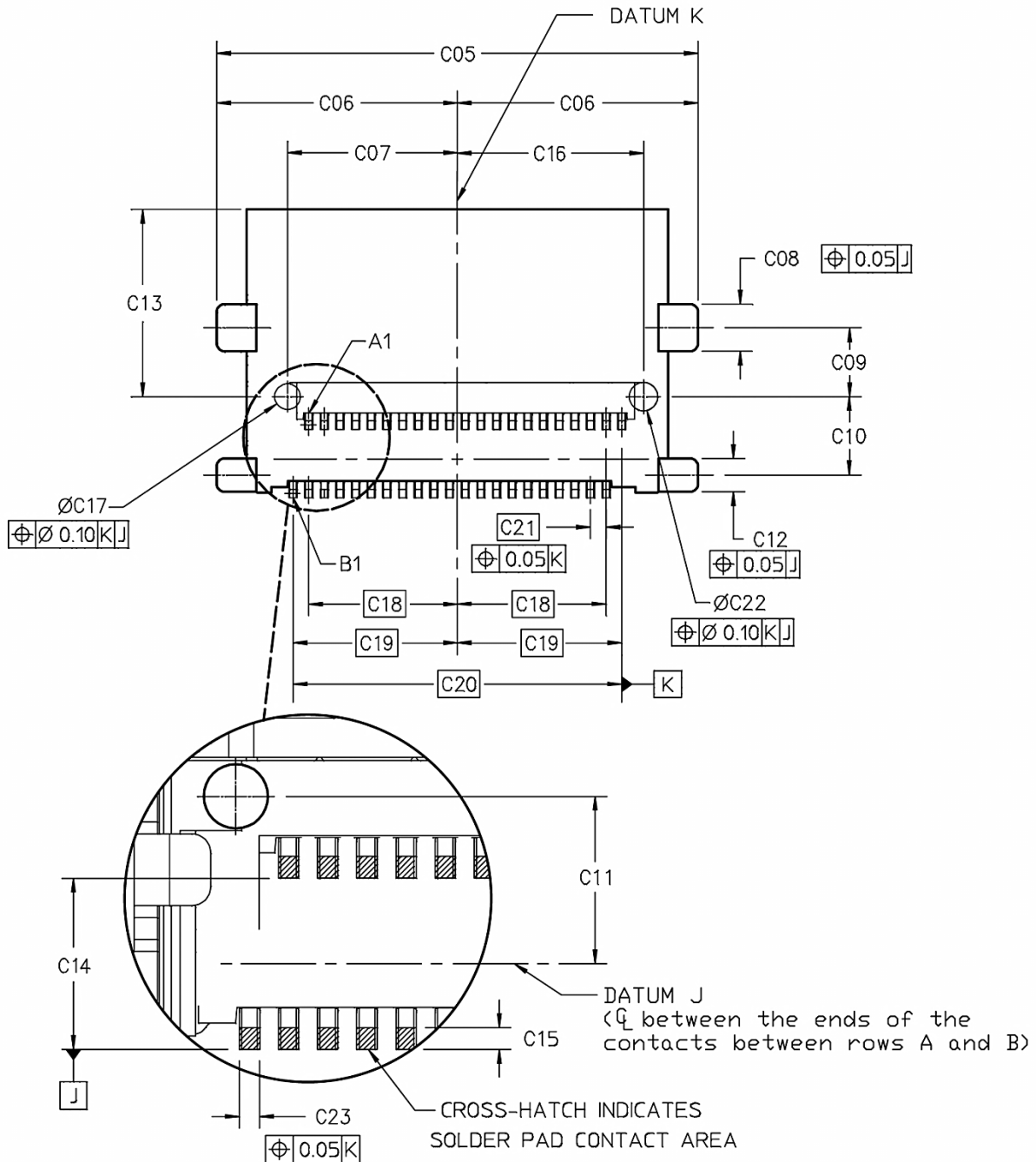


**Figure 4-7. x4 Fixed Host Board-side Right-Angle Form Factor**



**Note:** The mating interface for x4 fixed host board-side right-angle connectors is the same as for the vertical version (see Figure 4-4). Refer to Chapter 3 for connector pinouts and contact sequencing.

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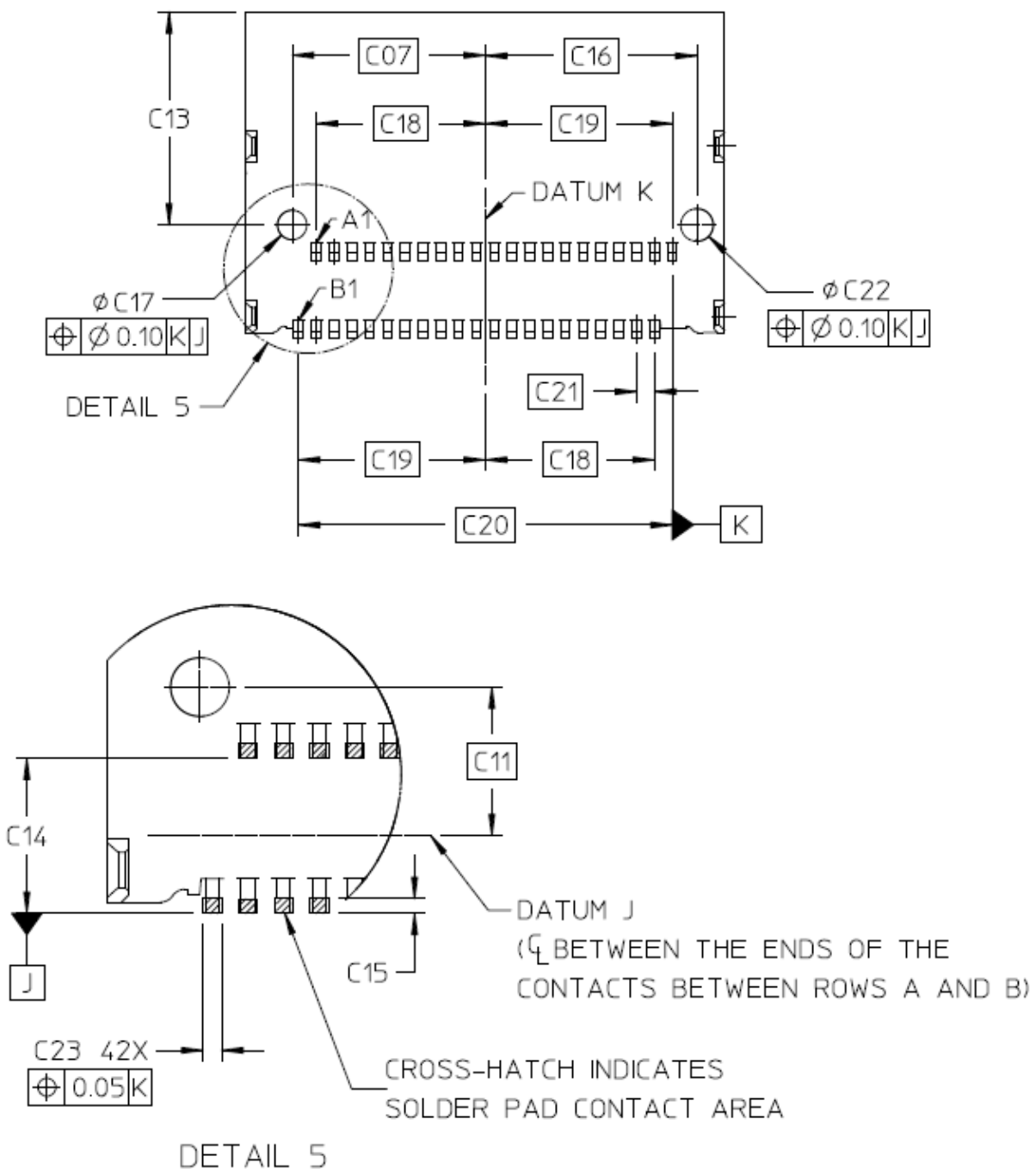


**Figure 4-7. x4 Fixed Host Board-side Right Angle Connector Form Factor**



**Note:** The x4 Fixed Host Board-side Right Angle Connector Mating Interface Dimensions are the same as for the Vertical version (see Figure 4-3).

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**Note:** The mating interface for x4 fixed host board-side right-angle connectors is the same as for the vertical version (see Figure 4-4).

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**Table 4-3. x4 Fixed Host Board-side Right Angle Connector Dimensions**

ID	Description	Dimension	Tolerance $\pm$
C01	Connector (shell) length	9.00	0.05
C02	Connector (shell) height from bottom of shell solder legs (Datum H)	3.90	Ref
C03	Locating peg length (2X)	0.52	0.10
C04	CL of interface paddle thickness (Datum E) to bottom of shell solder legs (Datum H)	2.19	0.08
C05	Length from end of left to end of right solder legs	15.38	0.10
C06	Vertical CL of solder tail array (Datum K) to outside edge solder leg (2X)	7.69	0.05
C07	Vertical CL of solder tail array (Datum K) to CL of left locating peg	5.42	0.08
C08	Large shell solder leg width	1.50	0.10
C09	Horizontal CL locating pegs to CL of large solder legs	2.20	0.11
C10	Horizontal CL locating pegs to CL of small solder leg	2.50	0.11
C11	Horizontal CL of locating pegs to CL solder tail array (Datum J)	2.14	0.19
C12	Small solder leg width	1.06	0.10
C13	Horizontal CL of locating pegs to front of shell	5.97	0.11
C14	End of solder tail Row “A” contacts to end of solder tail Row “B” contacts	2.18	0.16
C15	Length of solder pad contact area	0.28	0.03
C16	Vertical CL of solder tail array (Datum K) to CL of right locating peg	5.95	0.08
C17	Small (left) locating peg diameter	0.82	+0.03/-0.15
C18	Vertical CL of solder tail array (Datum K) to CL of inside solder tails	4.75	Basic
C19	Vertical CL of solder tail array (Datum K) to CL of outside solder tails	5.25	Basic
C20	CL to CL of outside solder tails	10.50	Basic
C21	Solder tail contact pitch	0.50	Basic
C22	Right locating peg diameter	0.97	+0.03/-0.15
C23	Solder tail width (solder pad contact area) (42x)	0.26	0.03

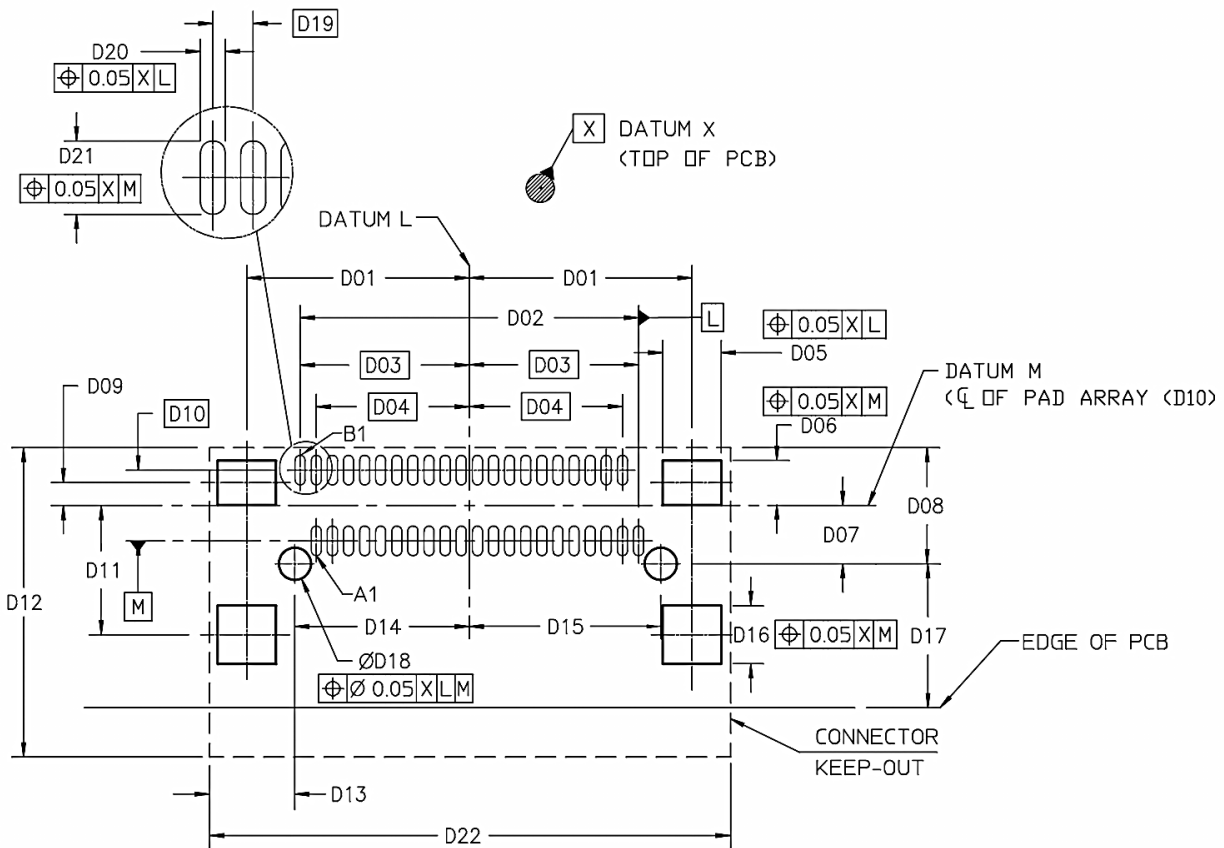
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**Table 4-3. Dimensions for x4 Fixed Host Board-side Right-Angle Form Factor**

ID	Description	Dimension	Tolerance $\pm$
C01	Connector depth	9.00	0.05
C02	Connector height from bottom of shell seating surface (Datum H)	3.90	Ref
C03	Locating peg length (2X)	0.52	0.10
C04	CL of interface paddle thickness (Datum E) to bottom of shell seating surface (Datum H)	<b>2.20</b>	<b>MIN</b>
C05	Connector length	<b>13.45</b>	0.10
C06	REMOVED FROM DRAWING		
C07	Vertical CL of solder tail array (Datum K) to CL of left locating peg	5.42	<b>Basic</b>
C08	REMOVED FROM DRAWING		
C09	REMOVED FROM DRAWING		
C10	REMOVED FROM DRAWING		
C11	Horizontal CL of locating pegs to CL solder tail array (Datum J)	2.14	<b>Basic</b>
C12	REMOVED FROM DRAWING		
C13	Horizontal CL of locating pegs to front of shell	5.97	0.11
C14	End of solder tail Row "A" contacts to end of solder tail Row "B" contacts (Datum J)	2.18	0.16
C15	Length of solder pad contact area (42X)	0.28	0.03
C16	Vertical CL of solder tail array (Datum K) to CL of right locating peg	5.95	<b>Basic</b>
C17	Left locating peg diameter	<b>0.85</b>	<b>MAX</b>
C18	Vertical CL of solder tail array (Datum K) to CL of inside solder tails	4.75	Basic
C19	Vertical CL of solder tail array (Datum K) to CL of outside solder tails	5.25	Basic
C20	CL to CL of outside solder tails (Datum K)	10.50	Basic
C21	Solder tail pitch	0.50	Basic
C22	Right locating peg diameter	<b>0.85</b>	<b>MAX</b>
C23	Width of solder pad contact area (42X)	0.26	0.03
Note: These dimensions apply to Figures 4-7 and 4-8.			

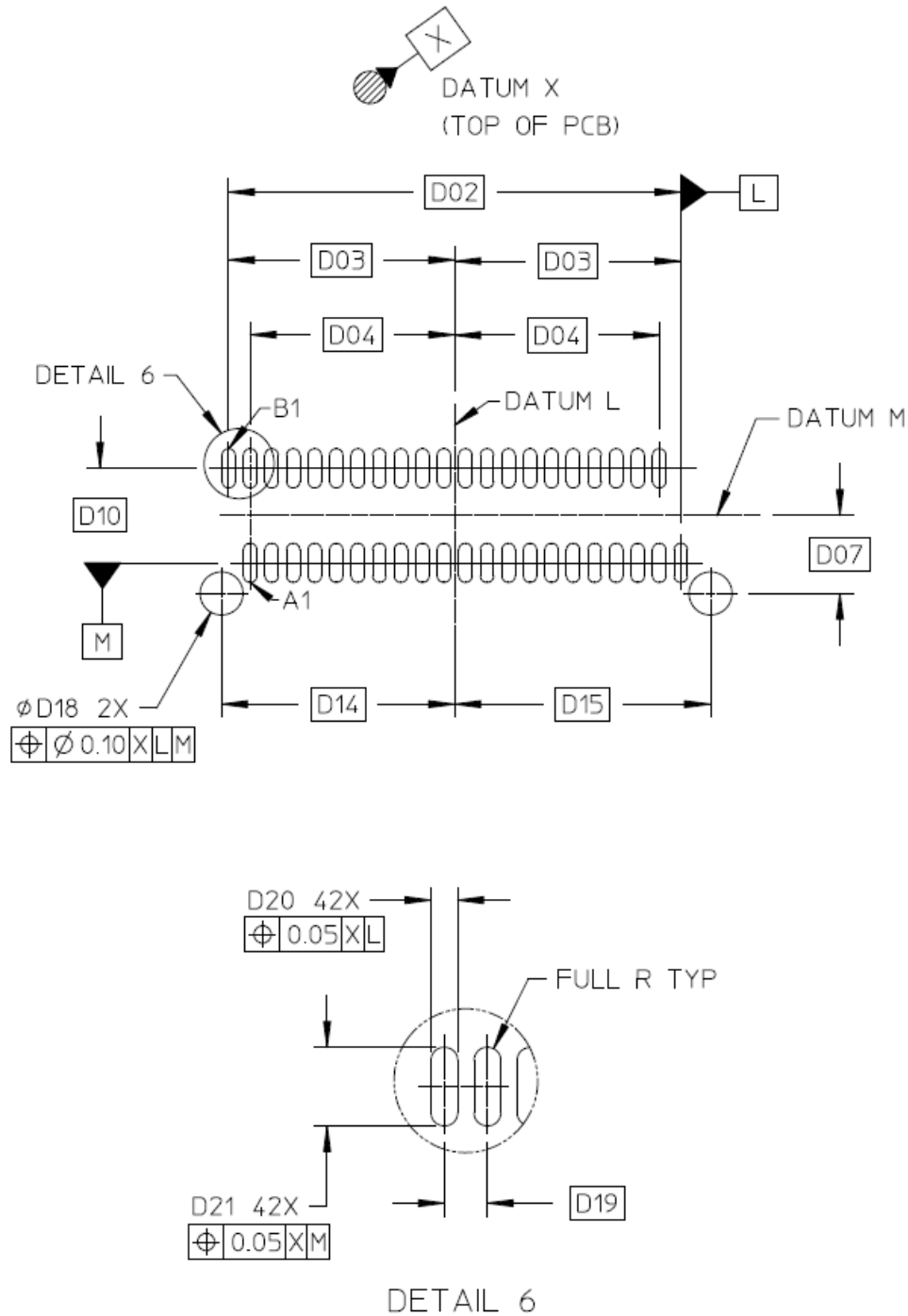


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**Figure 4-8. x4 Fixed Host Board-side Right Angle Connector Contact Footprint**

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**Figure 4-9. x4 Fixed Host Board-side Right-Angle Form Factor Normative Footprint Features**



**Note:** Refer to Appendix G for examples of shell hold-downs and keep-out zones.

# Request Request Request Request Request Request

**Table 4-4. Fixed Host Board-side x4 Right Angle Connector Contact Footprint Dimensions**

ID	Description	Dimension	Tolerance $\pm$
D01	Vertical CL of solder pad array (Datum L) to CL shell solder pads (4X)	6.91	0.05
D02	Vertical CL to CL of outside shell solder pads	10.50	0.05
D03	Vertical CL of solder pad array (Datum L) to outside solder pads	5.25	Basic
D04	Vertical CL of solder pad array (Datum L) to inside solder pads	4.75	Basic
D05	Shell solder pad width (4X)	1.81	0.10
D06	Small shell solder pad length (2X)	1.38	0.10
D07	Horizontal CL of locating holes to CL of solder pad array (Datum M)	1.81	0.10
D08	CL locating holes to back keep-out	3.45	0.10
D09	Horizontal CL of solder pad array (Datum M) to CL of small shell solder pads (2X)	0.71	0.10
D10	Horizontal CL of row B solder pads to CL of row A Solder-Pads	2.19	Basic
D11	Horizontal CL of solder-Pad Array (Datum M) to CL of large shell solder pads (2X)	4.01	0.05
D12	Connector (shell) depth keep-out zone	10.42	0.15
D13	CL locating hole to left side of connector keep-out zone	6.47	0.15
D14	Vertical CL of solder pad array (Datum L) to CL left locating hole	5.41	0.05
D15	Vertical CL of solder pad array (Datum L) to CL right locating hole	5.94	0.05
D16	Large shell solder pad length (2X)	1.80	0.10
D17	Horizontal CL of locating holes to front edge of PCB	4.46	0.10
D18	Locating hole diameter (2X)	1.00	0.05
D19	Solder pad pitch	0.50	Basic
D20	Solder pad width (42x)	0.31	0.03
D21	Solder pad length (42x)	0.91	0.03
D22	Horizontal width of connector keep-out zone	17.25	0.15

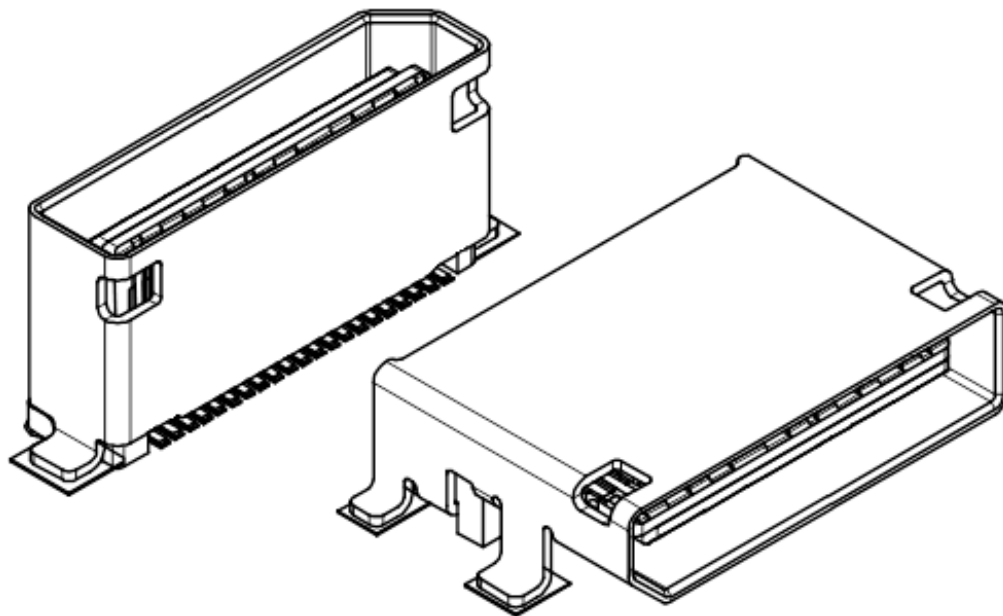
# Request Request Request Request Request Request

**Table 4-4. Dimensions for x4 Fixed Host Board-side Right-Angle Form Factor Normative Footprint Features**

ID	Description	Dimension	Tolerance $\pm$
D01	REMOVED FROM DRAWING ( <a href="#">EDITOR'S NOTE: moved to Appendix G; DD06</a> )		
D02	Vertical CL to CL of outer solder pads (Datum L)	10.50	<b>Basic</b>
D03	Vertical CL of solder pad array (Datum L) to CL outside solder pads	5.25	Basic
D04	Vertical CL of solder pad array (Datum L) to CL inside solder pads	4.75	Basic
D05	REMOVED FROM DRAWING ( <a href="#">EDITOR'S NOTE: moved to Appendix G; DD01</a> )		
D06	REMOVED FROM DRAWING ( <a href="#">EDITOR'S NOTE: moved to Appendix G; DD02</a> )		
D07	Horizontal CL of locating holes to CL of solder pad array (Datum M)	1.81	<b>Basic</b>
D08	REMOVED FROM DRAWING ( <a href="#">EDITOR'S NOTE: moved to Appendix G; DD07 (SMT) &amp; DD15 (Thru Hole)</a> )		
D09	REMOVED FROM DRAWING ( <a href="#">EDITOR'S NOTE: moved to Appendix G; DD04</a> )		
D10	Horizontal CL of <del>R</del> ow B solder pads to CL of <del>R</del> ow A solder pads (Datum M)	2.19	Basic
D11	REMOVED FROM DRAWING ( <a href="#">EDITOR'S NOTE: moved to Appendix G; DD05</a> )		
D12	REMOVED FROM DRAWING ( <a href="#">EDITOR'S NOTE: moved to Appendix G; DD08 (SMT) &amp; DD16 (Thru hole)</a> )		
D13	REMOVED FROM DRAWING ( <a href="#">EDITOR'S NOTE: Width of keep-out now split over Datum L; dimension no longer needed</a> )		
D14	Vertical CL of solder pad array (Datum L) to CL left locating hole	5.41	<b>Basic</b>
D15	Vertical CL of solder pad array (Datum L) to CL right locating hole	5.94	<b>Basic</b>
D16	REMOVED FROM DRAWING ( <a href="#">EDITOR'S NOTE: moved to Appendix G; DD03</a> )		
D17	REMOVED FROM DRAWING ( <a href="#">EDITOR'S NOTE: distance to edge of PCB is application specific</a> )		
D18	Locating hole diameter (2X)	1.00	0.05
D19	Solder pad pitch	0.50	Basic
D20	Solder pad width (42x)	0.31	0.03
D21	Solder pad length (42x)	0.91	0.03
D22	REMOVED FROM DRAWING ( <a href="#">EDITOR'S NOTE: moved to Appendix G; DD09 (SMT) &amp; DD17 (Thru hole)</a> )		

## 4.4. x4 Fixed Host Board-side Connector Latching

- The windows in the top of the x4 Fixed Host Board-side right angle connector and the windows in the side wall of the Fixed (host-side) vertical connector serve as the latching points for the Free (Cable-side) latches (see Chapter 6).
- The windows accept both passive and active latching solutions that are defined on the Free Cable-side. The windows are located in relation to the connector contacts to enable the Cable-side to reliably mate to the host-side connector with acceptable minimum contact wipe in worst case tolerance conditions.
- As the x4 Fixed (Board-side) connectors are the same for both external and internal applications, the latch points are the same for both (see Figure 4-2).

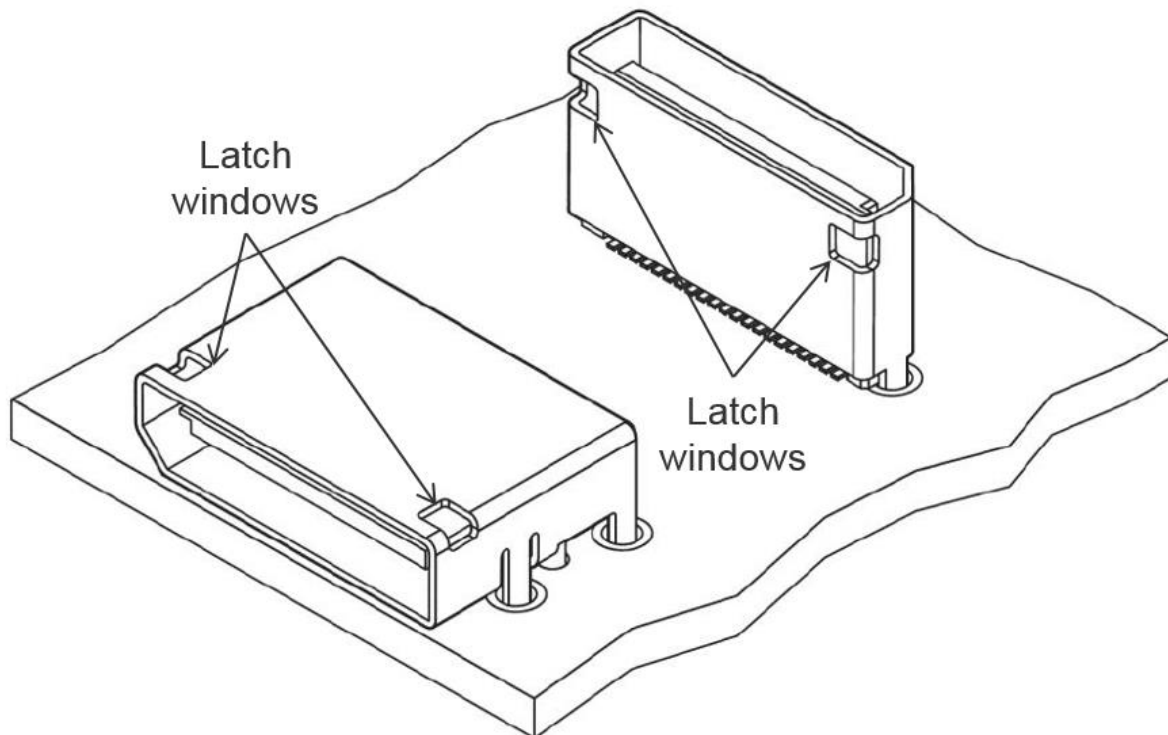


**Figure 4-9. Isometrics of x4 Fixed Host Board-side Connectors with Latching Window Detail**

## 4.3. x4 Fixed Host Board-side Connector Latching

All fixed host board-side connectors contain latch windows. These windows:

- Are located on the top of the x4 fixed host board-side right-angle connector and in the side wall of the fixed host board-side vertical connector (see Figure 4-10).
- Serve as the latching points for the free cable-side connectors (see Section 6-4).
- Accept both passive and active latches from the free cable-side connector. The windows are located such that cable assemblies mate reliably to the fixed host board-side connectors with acceptable minimum wipe, even under worst case tolerance conditions.
- Are the same for all fixed host board-side connectors and do not change for internal or external applications.

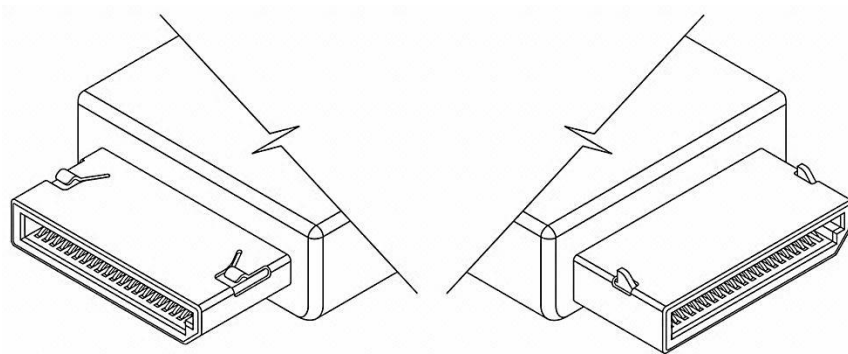


**Figure 4-10. Latch Windows in x4 Fixed Host Board-side Connectors**

## 5. x4 Free Cable side Connector

The x4 Free Cable-side Connector mates with all x4 Host Board-side connectors.

- It must be capable of incorporating either passive or active latching solutions for finished cable assemblies to be mechanically retained to the x4 Fixed-side connectors.
- The bulk cable to connector attachment varies by the type of bulk cable, as well as the variety of cable exit solutions, and is left to the cable assembly suppliers to define. Completed cable assemblies must comply with the cable exit form factor dimensions, defined in this Specification.



Representative  
Passive Latch

Representative  
Active Latch

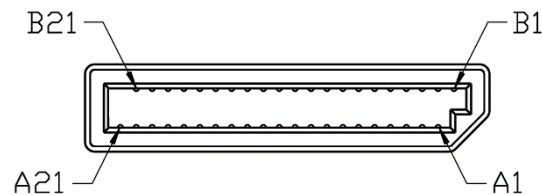
**Figure 5-1. Isometric of the x4 Free Cable-side Mating Interface for all Passive and Active Latch Cable Assemblies**

## 5. x4 Free Cable-side Connector

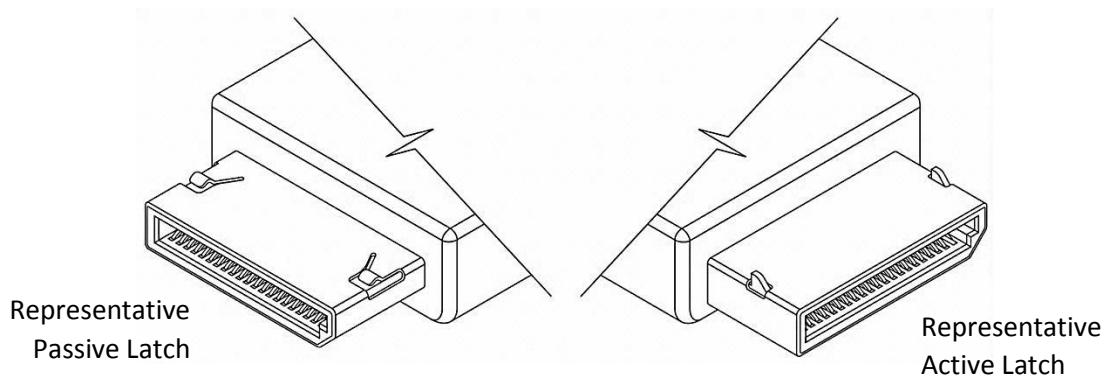
The x4 free cable-side connector mates with all x4 fixed host board-side connectors. Free cable-side connectors:

- ☐ Support the mating interface defined in this Chapter.
- ☐ Adhere to the pin numbering scheme illustrated in Figure 5-1.
- ☐ Must be used for electrically passive and electrically active cable assemblies, for both internal and external applications
- ☐ Must incorporate either passive or active latching solutions so that they may be mechanically retained by x4 fixed host board-side connectors (see Figure 5-2).

*[EDITORS NOTE: Some of these bullets were moved from Chapter 6. Figure 5-1 was moved from Chapter 6.]*



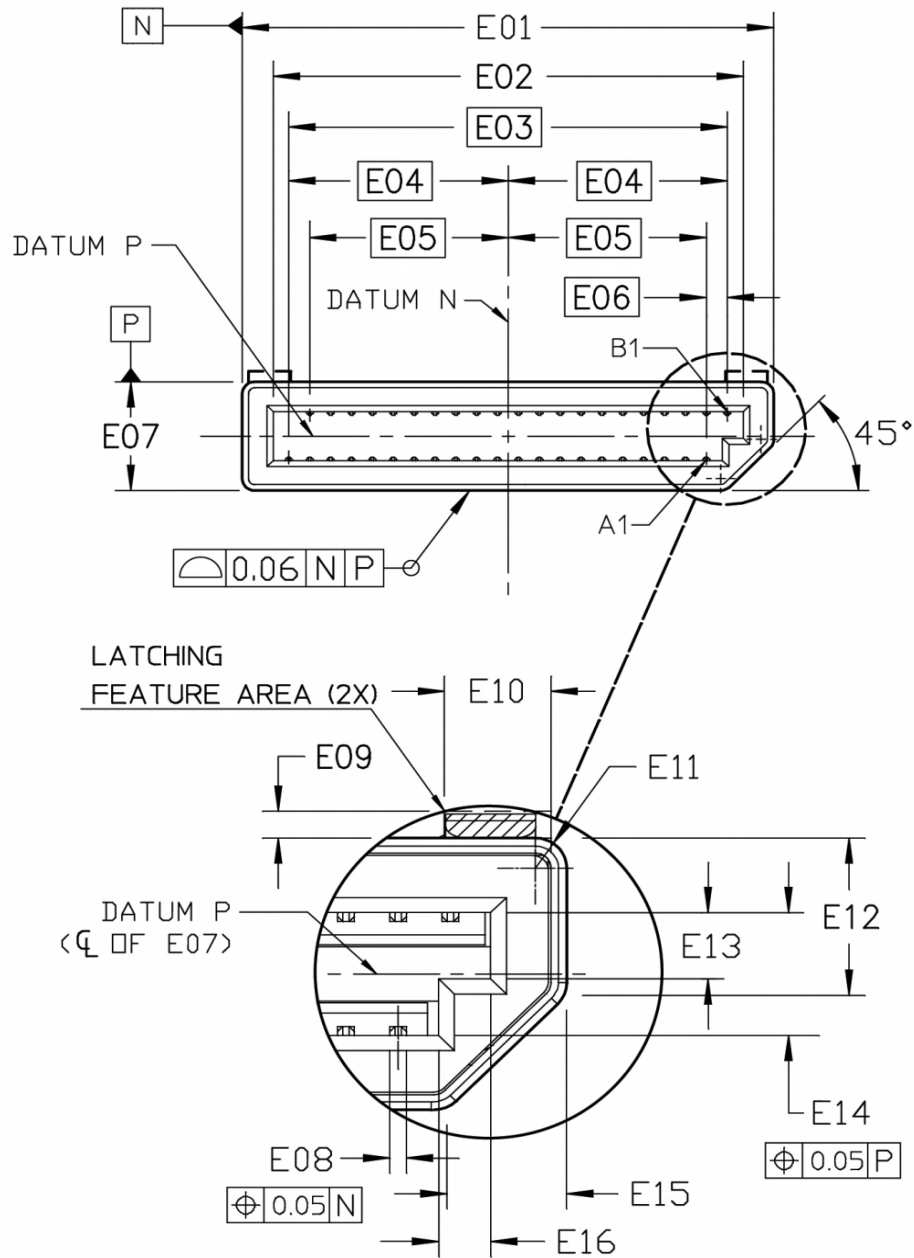
**Figure 5-1. Pin number locations for x4 Free Cable Assemblies**



**Figure 5-2. x4 Free Cable-side Connectors with Passive and Active Latches**

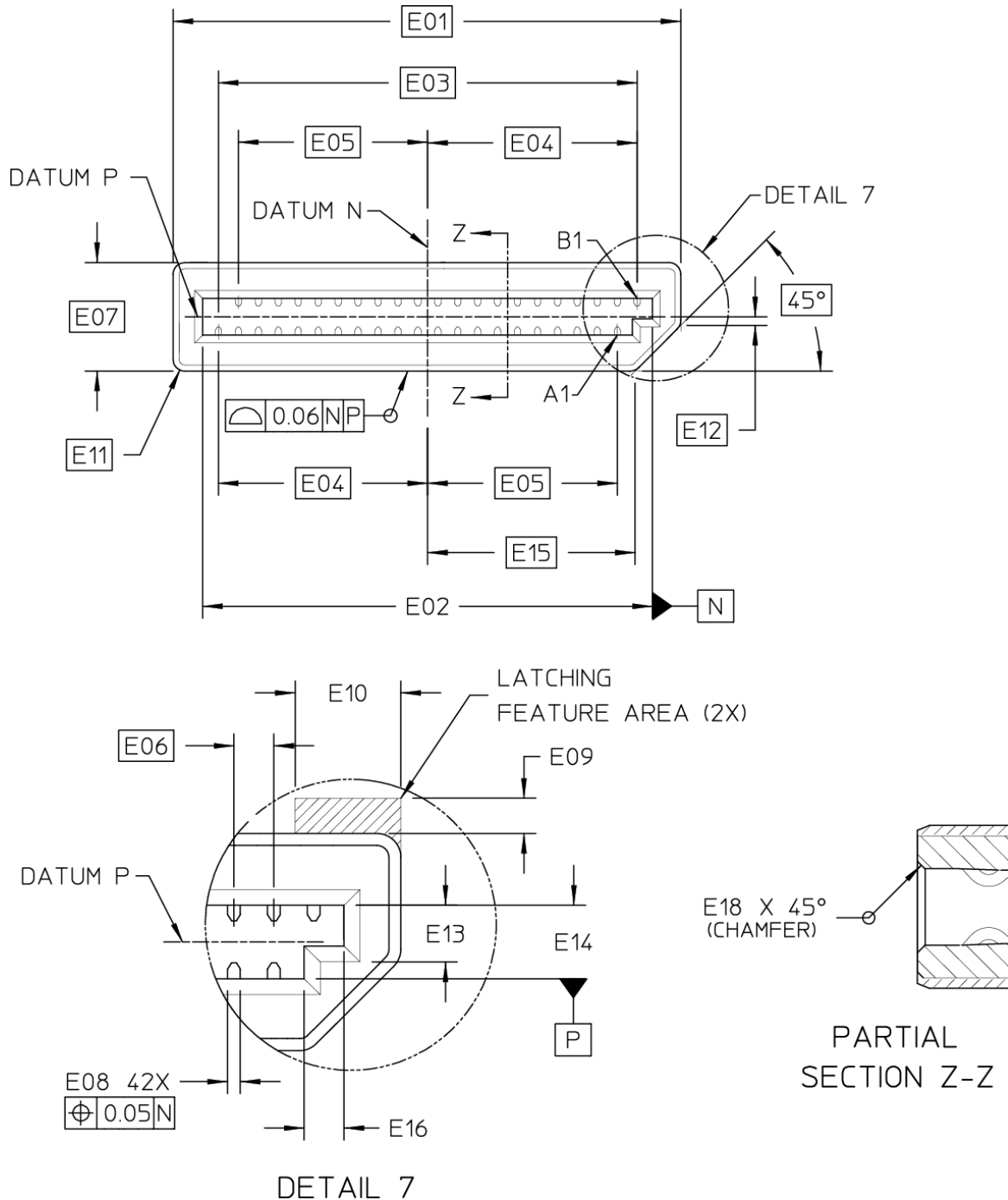


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**Figure 5-2. Mating Interface for x4 Free-side Cables**

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**Figure 5-3. x4 Free Cable-side Form Factor Mating Interface**



**Note:** This mating interface applies to all x4 free cable-side connectors. [Additional features such as chamfers and fillets may be added as desired so long as they do not prevent contact with the surface designated “hard stop” on the fixed host board-side connector \(refer to Figure 4-2\) when mated.](#)


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**Table 5-1. Dimensions for the x4 Free-side Cable Mating Interface**

ID	Description	Dimension	Tolerance $\pm$
E01	Connector Shell width (Datum N)	12.73	0.03
E02	Upper row interface width	11.28	0.03
E03	CL to CL of outside of contact beams	10.50	Basic
E04	Vertical CL of connector shell to CL outside contact beams	5.25	Basic
E05	Vertical CL of connector shell to CL of inside contact beams	4.75	Basic
E06	Contact beam pitch	0.50	Basic
E07	Connector shell height (Datum P)	2.72	0.03
E08	Contact beam width (42x)	0.16	0.03
E09	Clearance area reserved for latching mechanism (height) (2X)	0.43	0.05
E10	Clearance area reserved for latching mechanism (width) (2X)	1.05	0.05
E11	Outside radius (all)	0.30	MAX
E12	Top of shell to polarizing feature	1.57	0.04
E13	Polarizing notch height	0.67	0.03
E14	Interface cavity height (A side to B side)	1.23	0.05
E15	Side of shell to inside polarizing feature	1.15	0.05
E16	Polarizing notch width	0.50	Ref
E17	Interface width minus the polarizing feature	10.70	0.03

# Request Request Request Request Request Request

**Table 5-1. Dimensions for x4 Free Cable-side Form Factor Mating Interface**

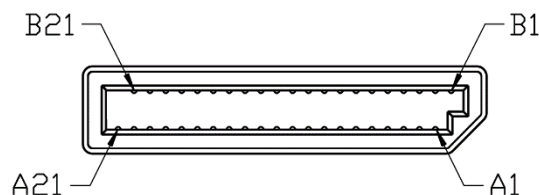
ID	Description	Dimension	Tolerance ±
E01	Connector  Shell width	12.73	<b>Basic</b>
E02	Upper row interface width (Datum N)	11.28	0.03
E03	CL to CL of outside of contact beams	10.50	Basic
E04	Vertical CL of connector shell (Datum N) to CL outside contact beams	5.25	Basic
E05	Vertical CL of connector shell (Datum N) to CL of inside contact beams	4.75	Basic
E06	Contact beam pitch	0.50	Basic
E07	Connector shell height	2.72	<b>Basic</b>
E08	Contact beam width (42x)	0.16	0.03
E09	Latching mechanism height (2X)	<b>0.48</b>	<b>MAX</b>
E10	Latching mechanism width (2X)	<b>1.10</b>	<b>MAX</b>
E11	Outer radius of free connector shell (5X)	0.30	<b>Basic</b>
E12	CL interface cavity (Datum P) to outer sharp corner of shell (TSC)	<b>0.17</b>	<b>Basic</b>
E13	Polarizing notch height	0.67	0.03
E14	Interface cavity height (A side to B side) (Datum P)	1.23	0.05
E15	CL interface cavity (Datum N) to outer sharp corner of shell (TSC)	<b>5.19</b>	<b>Basic</b>
E16	Polarizing notch width	0.50	<b>MAX</b>
E17	REMOVED FROM DRAWING		
<b>E18</b>	<b>Lead-in chamfer</b>	<b>0.20</b>	<b>MIN</b>

## 6. x4 Free Cable Assemblies

This chapter specifies x4 Free Cable Assembly attributes, signal pinouts and mechanical details, including drawings for the cable assembly form factors. The x4 Free internal cable assemblies have different constructions from the external box-to-box Free Cables and are shown separately.

### 6.1. x4 Free Cable Assembly Attributes

- ❑ Both passive and active cables must be invisible to system software (i.e., they are treated as software-transparent).
- ❑ Dual bundle, single bundle and ribbon cable solutions are acceptable, providing they meet all performance and form factor requirements (not all versions are shown).
- ❑ All x4 Free Cable Assemblies have the same pin numbering, as shown in Figure 6-1.
- ❑ See Table 3-1 and Table 3-2 for the Fixed internal connector pin assignments and Table 3-3 for the Fixed external connector pin assignments – *they are different*.



**Figure 6-1. Pin number locations for x4 Free Cable Assemblies**

#### 6.1.1. x4 Passive Free Cable Solution Attributes

- ❑ Must not contain active components to (re-)drive the PCI Express signals across the cable.
- ❑ Is permitted to be limited to relatively short lengths; (i.e., 1 m – 2 m).
- ❑ Shielding may not be required for internal cables.

## 6. x4 Free Cable Assemblies

This chapter specifies x4 free cable assembly attributes, signal pinouts and mechanical details, including drawings for free cable assemblies. The x4 free internal cable assemblies have different constructions than the x4 free external cable assemblies and are shown separately.

### 6.1. x4 Free Cable Assembly Attributes

Cable assemblies may be part of electrically passive or electrically active solutions. These cable assemblies:

- ☐ Must be invisible to system software (i.e., they are treated as software-transparent).
- ☐ Must contain free cable-side connectors that adhere to the requirements defined in Chapter 5 of this Specification.
- ☐ Follow the wiring charts defined in Tables 6-9 and 6-10 for their intended application.
- ☐ May utilize any bulk cable type (e.g. dual bundle, single bundle, ribbon cable, etc.) and any cable exit. Finished cable assemblies must comply with the cable assembly form factor dimensions and performance requirements defined in this section, regardless of these variations, which are to be defined by the cable assembly supplier.

*[EDITORS NOTE: Figure 6-1 was moved to Chapter 5.]*

#### 6.1.1. x4 Passive Free Cable Solution Attributes

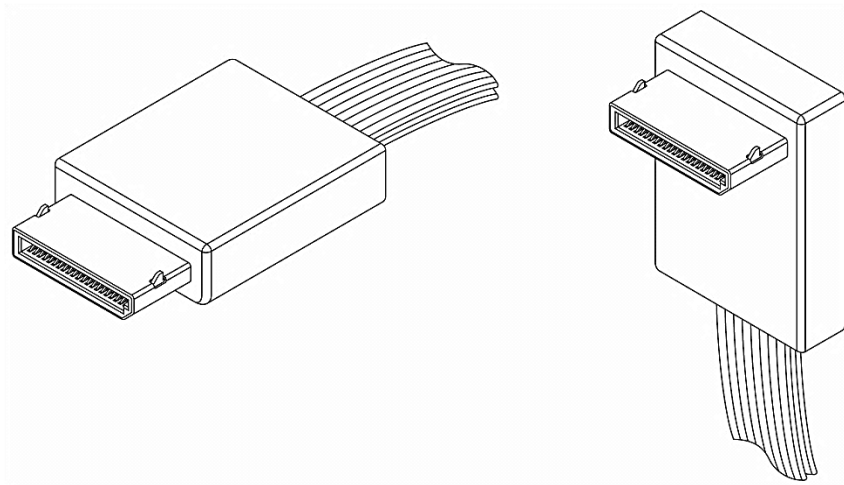
All x4 free passive cable assemblies have the following attributes:

- ☐ Must not contain active components to (re-)drive the PCI Express signals across the cable.
- ☐ Are permitted to be limited to relatively short lengths; (i.e., 1 m – 2 m).
- ☐ May not require shielding for internal applications.

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## 6.1.2. x4 Active Free Cable Assembly Attributes

- All external cable assemblies must provide 360° shielding from end to end.
- Is permitted to be implemented using copper or optical physical media.
- Is permitted to support maximum peripheral power of 10 W (equally distributed on the two 5 V power pins specified).
- Is permitted to support arbitrarily long cable lengths, as constrained by the active component power budget and PCI Express clocking schemes, in specific applications.
- Additional information regarding Active cables is contained in Appendix E.



**Figure 6-2. Isometrics of x4 Free Internal Straight-out Exit and Right Angle Exit Cable Assemblies**

- See Chapter 5 for x4 Free Cable-side Connector mating interface dimensions.
- See Figure 6-9 and Figure 6-10 for contact and latch locations for any Free-side cable interface.
- See Sections 4.1 and 4.2 for the x4 Fixed Host Board-side Vertical Connector dimensions.
- See Wiring Charts in Chapter 6 for cable assembly wiring.
- Ribbon cable shown for internal cables; other bulk cable solutions are acceptable for both external and internal solutions.

## 6.1.2. x4 Free Active Cable Solution Attributes

All x4 free active cable assemblies have the following attributes:

- ☐ Must provide 360° shielding from end to end.
- ☐ Are permitted to be implemented using copper or optical physical media.
- ☐ Are permitted to support maximum peripheral power of 10 W (equally distributed on the two 5 V power pins specified).
- ☐ Are permitted to support arbitrarily long cable lengths, as constrained by the active component power budget and PCI Express clocking schemes, in specific applications.

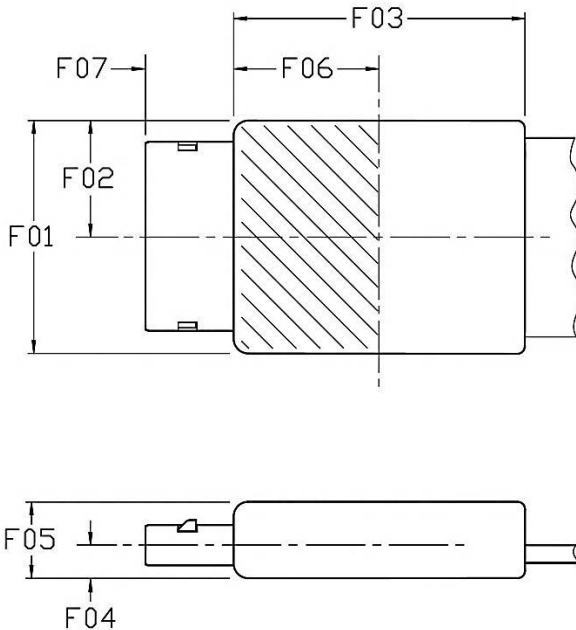
Additional information regarding active cables is contained in Appendix E.

*[EDITORS NOTE: Figure 6-2 moved to Section 6.2. The second section of bullet points was redistributed to various other chapters.]*



## 6.2. x4 Free Internal Cable Specification

### 6.2.1. x4 Free Internal Straight-out Cable Exit Assembly Form Factor

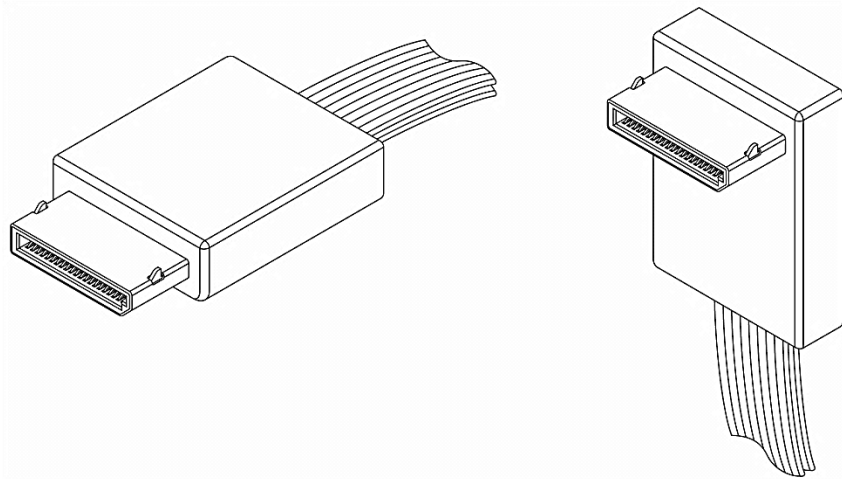


Note: Release Latch to keep within the cross-hatched area of F01 and F06.

**Figure 6-3. x4 Free Internal Straight-out Cable Exit Form Factor**

## 6.2 x4 Free Internal Cable Specification

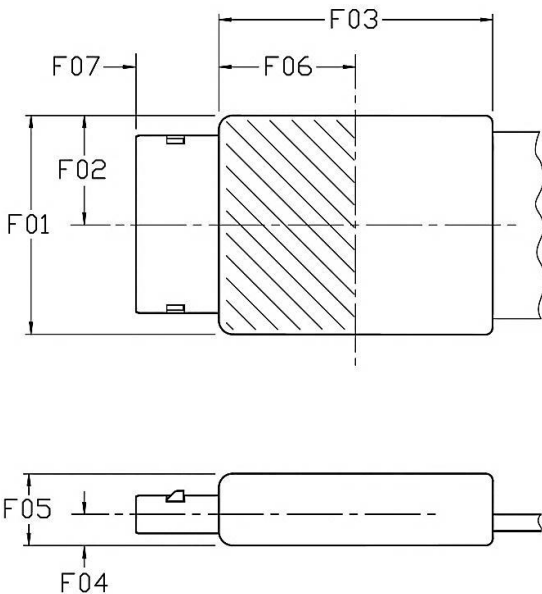
Free internal cable form factors may utilize any cable exit. Straight-out and right-angle down variants are shown. Other variants must meet the cable form factor dimensions defined in this section and the mechanical performance requirements defined in Section ## (*EDITORS NOTE: Point to "Performance Requirements for Connectors and Cables" section*).



**Figure 6-2. x4 Free Straight-out and Right-angle Internal Cable Assemblies**

[EDITORS NOTE: Figure 6-2 was moved from Section 6.1.2]

### 6.2.1. x4 Free Straight-out Internal Cable Form Factor



**Figure 6-3. x4 Free Straight-out Internal Cable Form Factor**

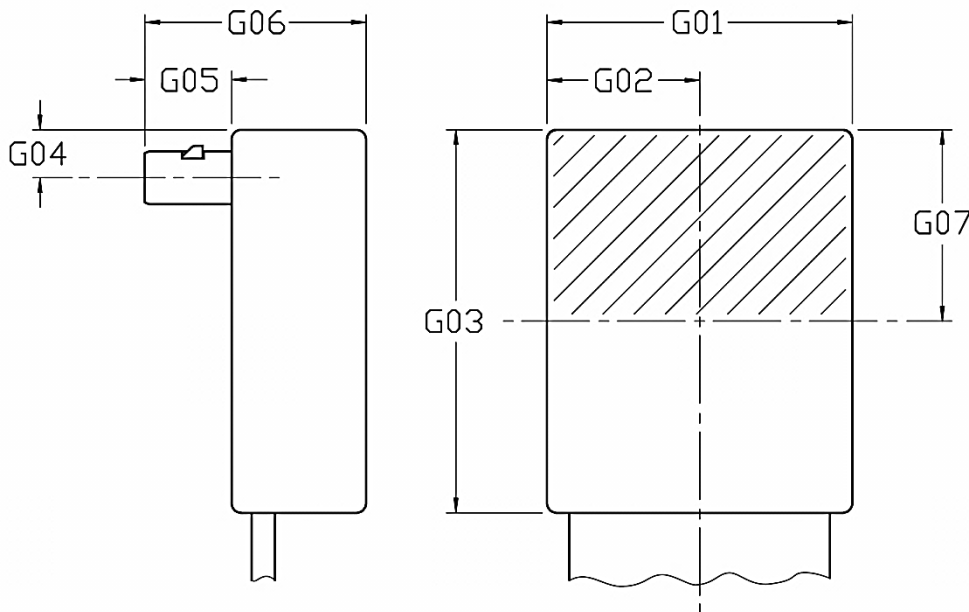
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**Table 6-1. Dimensions for x4 Free Internal Straight-out Cable Exit Form Factor**

Designator	Description	Dimension	Tolerance $\pm$
F01	Housing width	17.00	MAX
F02	CL to housing edge	As required for F01	
F03	Housing length	20.00	MAX
F04	Connector CL to bottom of housing	2.20 (Note 1)	MAX
F05	Housing thickness	7.25	MAX
F06	Boundary for release latch	10.1	MAX
F07	Connector snout length	5.95	0.25

Notes:1. Required to enable the plug to be mated to a Mid-board-mounted x4 Fixed Right Angle Connector.  
2. See Figure 6-9 and Table 6-7 for passive latch dimensions.

## 6.2.2. x4 Free Internal Right-angle Down Cable Exit Assembly Form Factor



Note: Release Latch to keep within the cross-hatched area of G01 and G07

**Figure 6-4. x4 Free Internal Right angle Down Cable Exit Form Factor**

# Request Request Request Request Request Request

Table 6-1. Dimensions for x4 Free Straight-out Internal Cable Form Factor

ID	Description	Dimension	Tolerance ±
F01	Housing width	17.00	MAX
F02	CL of plug shell to housing edge	8.50	MAX
F03	Housing length	20.00	MAX
F04	CL of plug shell to bottom of housing	2.20 (Note 1)	MAX
F05	Housing thickness	7.50	MAX
F06	Boundary for latch release (Note 2)	10.00	MAX
F07	Connector snout length	5.95	0.25

NOTES:

1.

Required for clearance when mated to a right-angle receptacle mounted mid-board

Enables a straight-out cable assembly to be mated to a mid-board-mounted fixed host board-side right-angle connector.

2.

Refer to Section 6.4 for passive and active latch dimensions.

## 6.2.2. x4 Free Right-angle Down Internal Cable Form Factor

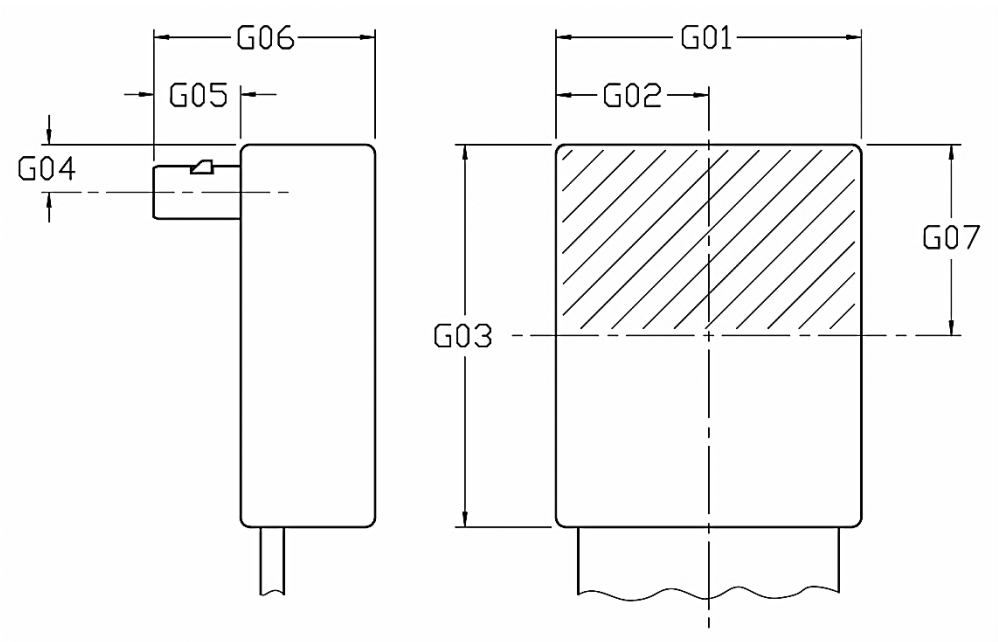


Figure 6-4. x4 Free Right-angle Down Internal Cable Form Factor

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**Table 6-2. Dimensions for x4 Free Internal Passive Right-Angle Down Cable Assembly Form Factor**

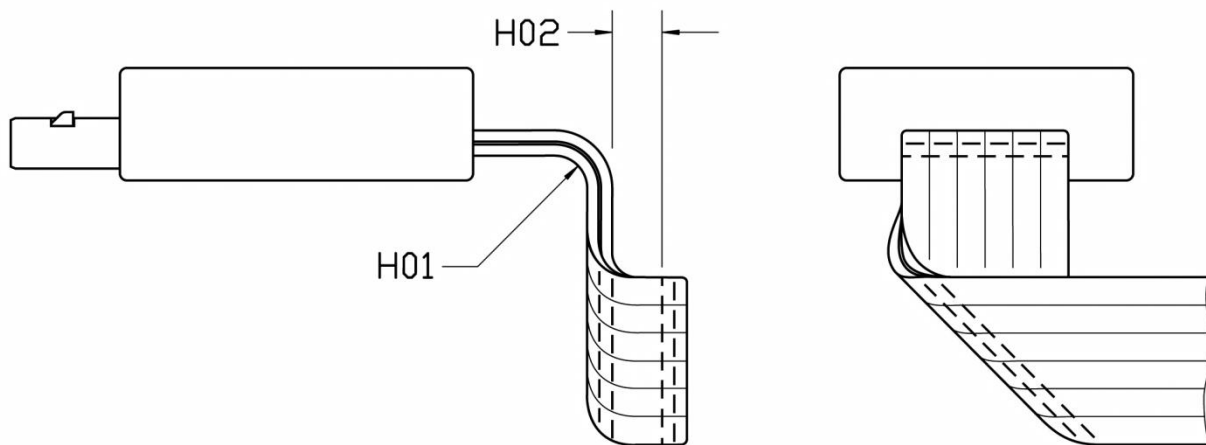
Designator	Description	Dimension	Tolerance $\pm$
G01	Housing width	17.00	MAX
G02	CL to housing edge	As Required by G01	
G03	Housing length	21.0	MAX
G04	Connector interface CL to edge of housing	6.5	MAX
G05	Connector snout length	5.0	MAX
G06	Overall height of plug	9.8 (Note 1)	MAX
G07	Boundary for release latch	10.1	MAX

Notes:

1. Enables mated height to remain below the maximum component height on a PCIe add-in card when mated to a x4 vertical host-side connector.
2. See Figure 6-8 and Table 6-10 for active latch dimensions.

## 6.2.3. x4 Free Internal Cable Assembly Physical and Mechanical Performance

- Strain relief not required, but cable assembly must meet application requirements.
- Additional mechanical requirements are stated in Chapter 5.



**Figure 6-5. x4 Free Internal Cable Bend Radius**

# Request Request Request Request Request Request

Table 6-2. Dimensions for x4 Free Right-Angle Down Internal Cable Form Factor

ID	Description	Dimension	Tolerance ±
G01	Housing width	17.00	MAX
G02	CL of plug shell to housing edge	8.50	MAX
G03	Housing length	21.0	MAX
G04	CL of plug shell to bottom of housing	6.5	MAX
G05	Connector snout length	4.62	0.38
G06	Overall height of right-angle plug assembly	9.8 (Note 1)	MAX
G07	Boundary for latch release (Note 2)	10.50	MAX
NOTES:			
1. Enables <a href="#">mated height of</a> a right-angle down cable assembly to remain below the maximum component height on a PCIe add-in card when mated to a fixed vertical host board-side connector.			
2. Refer to Section 6.4 for passive and active latch dimensions.			

## 6.2.3. x4 Free Internal Cable Mechanical Performance

All bulk cable used for free internal cable assemblies has the following attributes:

- ❑ Must meet mechanical requirements are stated in Section ## (*EDITORS NOTE: Point to “Performance Requirements for Connectors and Cables” section*).
- ❑ Strain relief not required.

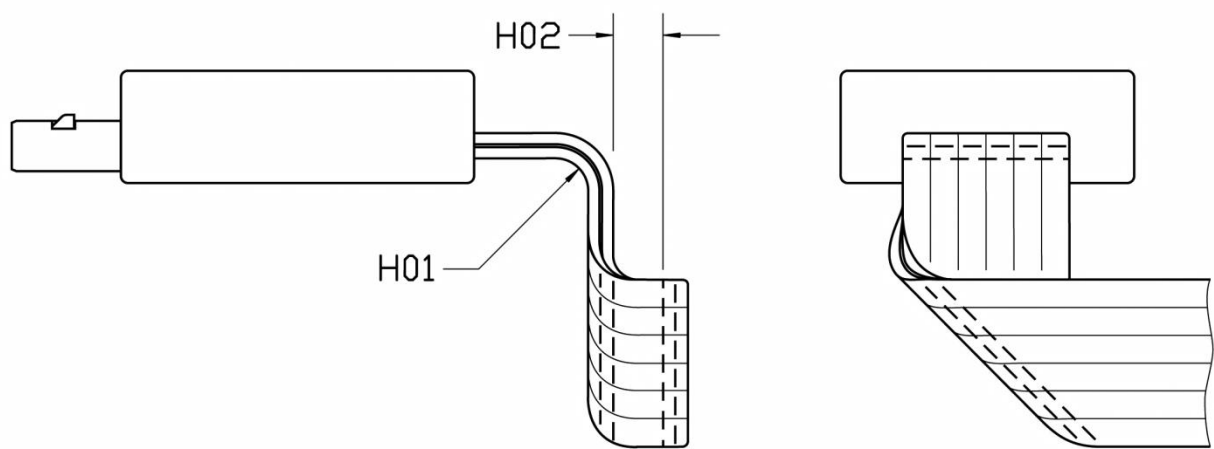


Figure 6-5. x4 Free Internal Cable Bend Radius

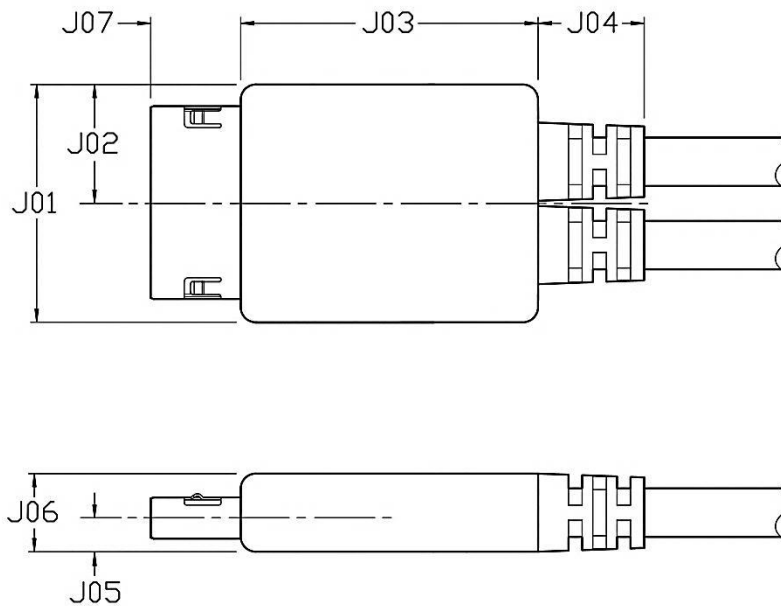
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**Table 6-3. x4 Free Internal Cable Flex Requirements**

ID	Description	Dimension	Tolerance $\pm$
H01	Cable Bend Radius	Bend R MIN supplier specific	Supplier specific
H02	Note: Flat cable must not be folded flat against itself when folded. A minimum clearance between cables at the fold must be supplier specific minimum to preserve the properties of the insulator and thereby the signal integrity.	MIN clearance for cable thickness fold radius supplier specific	

## 6.3. x4 Free External Passive Latch Cable Assembly Physical Form Factor

The physical form factor for the x4 Free External cable assembly is bounded by the dimensions shown in Figure 6-6 and Table 6-2.



**Figure 6-6. x4 Free External Passive Latch Cable Assembly Form Factor Dimensions**

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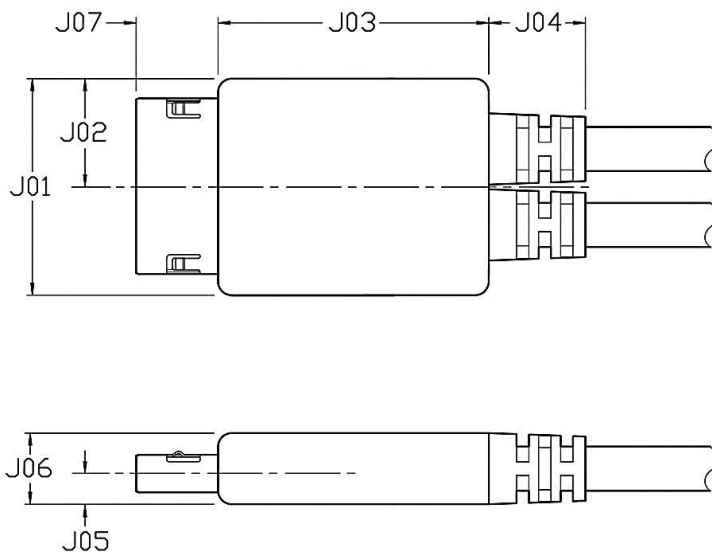
**Table 6-3. x4 Free Internal Cable Bend Radius Requirements**

ID	Description	Dimension	Tolerance $\pm$
H01	Cable bend radius	MIN (Note 1)	Supplier specific
H02	Cable fold radius (Note 2)	MIN (Note 1)	Supplier specific
NOTES: 1. To be specified by supplier. 2. Flat cable must not lay flat against itself when folded. Minimum fold radius is needed to preserve the properties of the insulator and therefore the signal integrity of the bulk cable.			

## 6.3 x4 Free External Cable Specification

Free external cable form factors may utilize passive or active latches. All cable assemblies must meet the appropriate mechanical performance requirements defined in Section ## (*EDITORS NOTE: Point to "Performance Requirements for Connectors and Cables" section*).

### 6.3.1. x4 Free External Cable Form Factor with Passive Latch



**Figure 6-6. x4 Free External Cable Form Factor with Passive Latch**



**Note:** Strain relief not required.



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**Table 6-4. Dimensions for the x4 Free Passive Latch External Cable Assembly Form Factor**

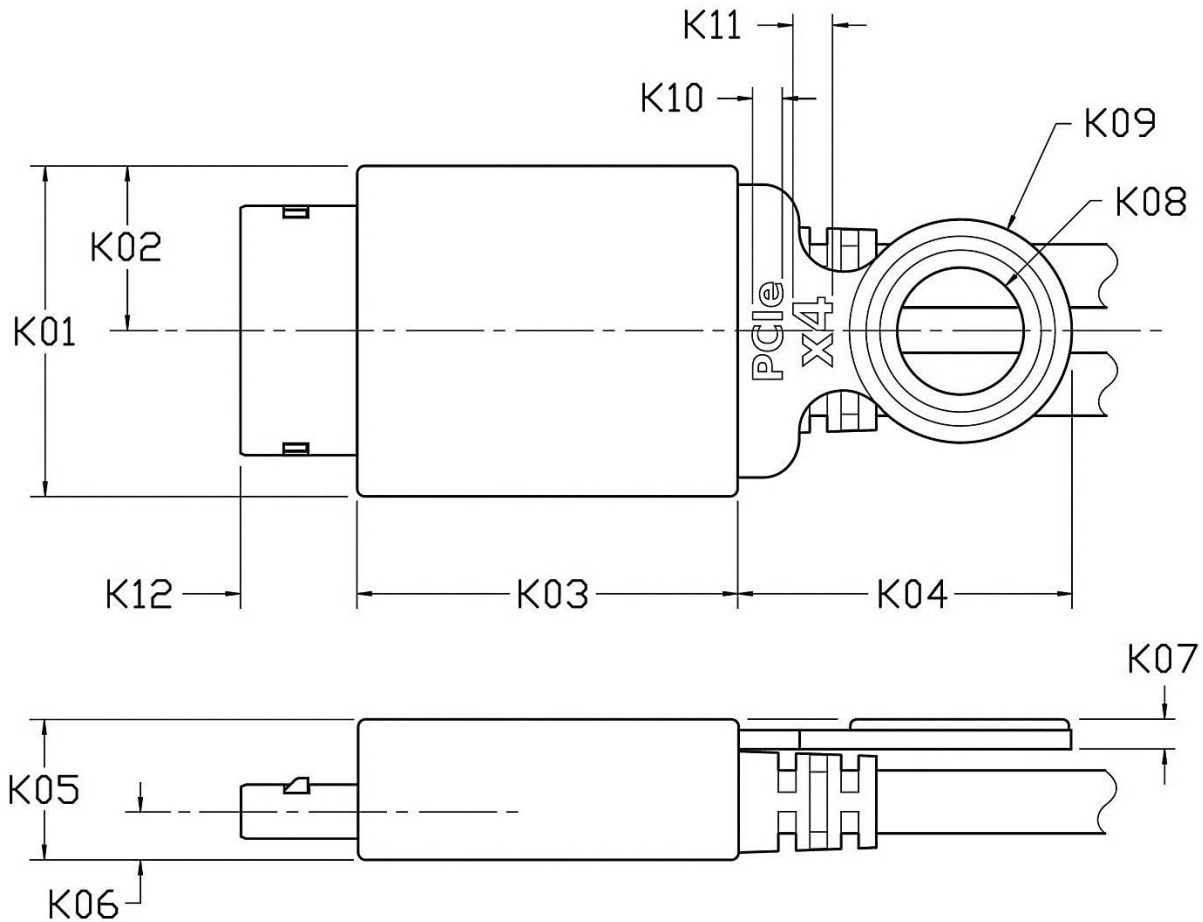
Designator	Description	Dimension	Tolerance $\pm$
J01	Width of housing	17.00	MAX
J02	CL of housing to edge	As required for J01	
J03	Housing length	25.00	MAX
J04	Length of flex relief (optional)	7.75	MAX
J05	Connector CL to bottom of housing	2.60 (Note 1)	MAX
J06	Thickness of housing	7.25	MAX
J07	Connector snout length	5.95	0.25
Notes:			
1. Enables belly-to-belly implementations on a 1.4 mm MIN thick host board.			
2. See Figure 6-9 and Table 6-7 for passive latch dimensions.			

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**Table 6-4. Dimensions for the x4 Free External Cable Form Factor with Passive Latch**

ID	Description <b>(Note 1)</b>	Dimension	Tolerance $\pm$
J01	Width of housing	17.00	MAX
J02	CL of plug shell to housing edge	<b>8.50</b>	<b>MAX</b>
J03	Housing length	25.00	MAX
J04	Length of flex relief (optional)	7.75	MAX
J05	CL of plug shell to bottom of housing (Note 2)	2.60	MAX
J06	Thickness of housing	<b>7.50</b>	MAX
J07	Connector snout length	5.95	0.25
NOTES:			
1. Refer to Section 6.4 for passive and active latch dimensions.			
2. Enables belly-to-belly implementations.			

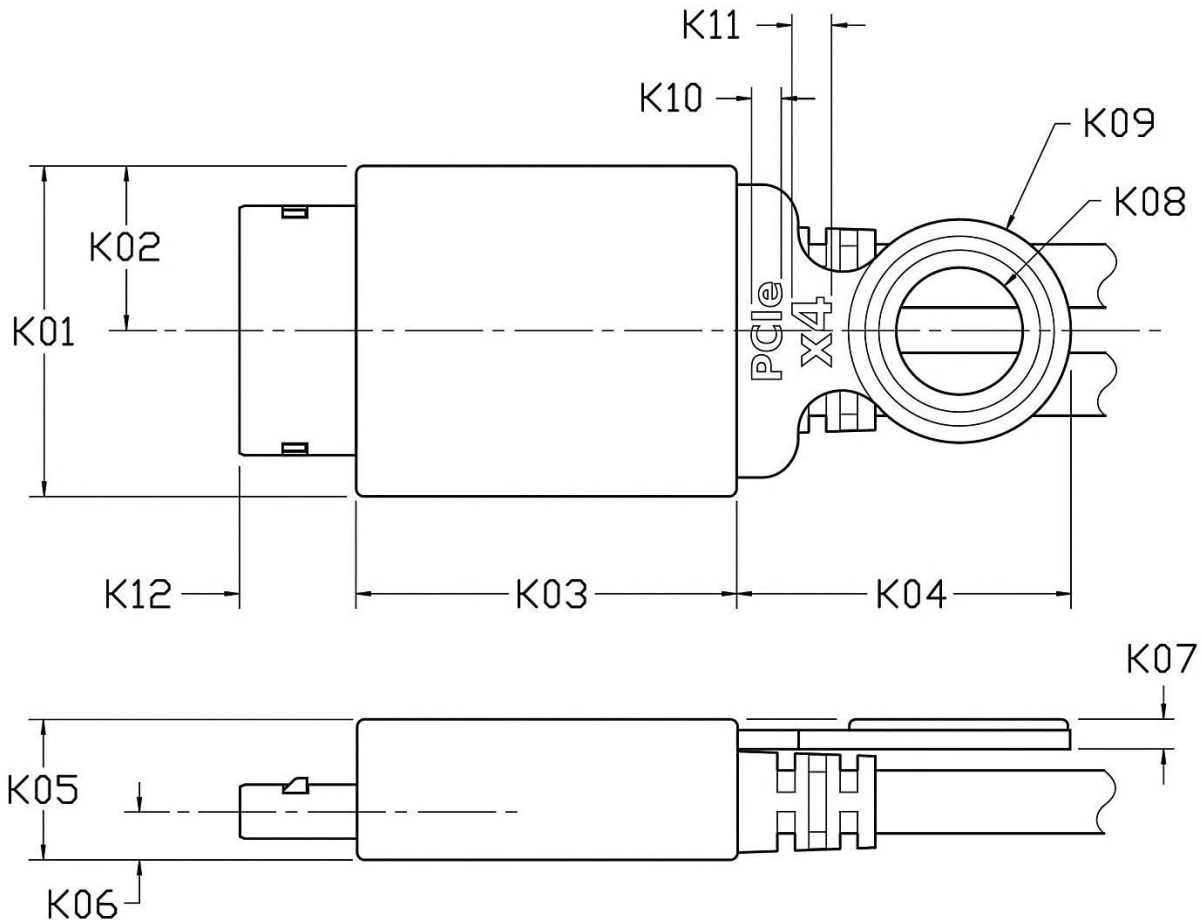
## 6.4. x4 Free External Active Latch Cable Assembly Physical Form Factor




Note: PCI Express latch pull tab to be Pantone 354U Green

**Figure 6-7. x4 Free External Active Latch Cable Assembly Form Factor Dimensions**

### 6.3.2. x4 Free External Cable Form Factor with Active Latch



**Figure 6-7. x4 Free External Cable Form Factor with Active Latch**

 **Note:** PCI Express latch pull tab to be Pantone 354U Green. Strain relief not required.

*[EDITORS NOTE: This section was previously Section 6.4.]*

# Request Request Request Request Request Request

**Table 6-5. Dimensions for the x4 Free External Active Latch Cable Assembly Form Factor**

ID	Description	Dimension	Tolerance $\pm$
K01	Width of housing	17.00	MAX
K02	Connector CL to edge of housing	As required for K01	
K03	Length of housing	25.00	MAX
K04	Pull tab length	20.00	MAX
K05	Thickness of housing	7.25	MAX
K06	CL of shell interface to bottom of housing	2.60 (Note 1)	MAX
K07	Pull tab thickness	1.5	MAX
K08	Diameter of opening in pull tab	6.4	0.5
K09	Outer radius of pull tab	5.7	0.5
K10	Height of PCIe characters	1.5	0.15
K11	Height of the x4 characters	2.0	0.15
K12	Connector snout length	5.95	0.25
Notes: 1. Enables belly-to-belly implementations on a 1.57 mm MIN thick host board. 2. See Figure 6-10 and Table 6-8 for active latch dimensions.			

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**Table 6-5. Dimensions for x4 Free External Cable Form Factor with Active Latch**

ID	Description (Note 1)	Dimension	Tolerance $\pm$
K01	Width of housing	17.00	MAX
K02	CL of plug shell to housing edge	8.50	MAX
K03	Housing length	25.00	MAX
K04	Pull tab length	20.00	MAX
K05	Thickness of housing	7.50	MAX
K06	CL of plug shell to bottom of housing (Note 2)	2.60	MAX
K07	Pull tab thickness	1.5	MAX
K08	Diameter of opening in pull tab	6.4	0.5
K09	Outer radius of pull tab	5.7	0.5
K10	Height of PCIe characters	1.5	0.15
K11	Height of the “x4” characters	2.0	0.15
K12	Connector snout length	5.95	0.25
NOTES:			
1. Refer to Section 6.4 for passive and active latch dimensions.			
2. Enables belly-to-belly implementations.			

## 6.5. x4 Free External Cable Assembly Physical and Mechanical Performance

- Table 6-6 lists the external cable bend radius requirements for static bending.
- Additional mechanical requirements are stated in Section 6.9

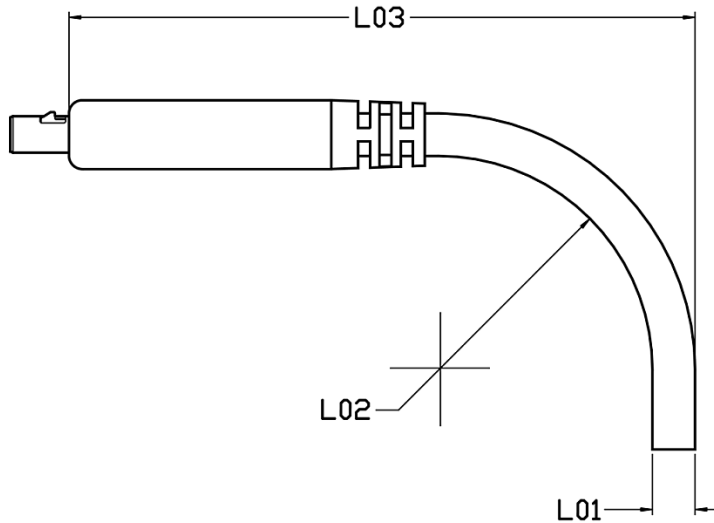


Figure 6.-8. x4 Free External Cable Assembly Bend Radius

Table 6-6. x4 Free External Cable Assembly Bend Radius Requirements

Designator	Description	Dimension	Tolerance $\pm$
L01	34 AWG 4-pair cable diameter	Supplier specific	Supplier specific
L02	Inner bend radius	Supplier specific by gage	MIN
L03	Face of connector housing to outside of cable bend	42.80	3.0

## 6.6. Latching for All x4 Free Cable Assemblies

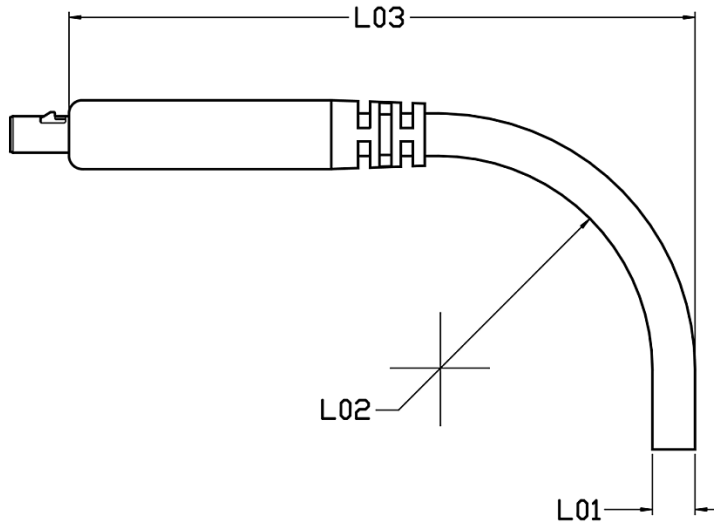
Figure 6-9 and Figure 6-10 show representative latch configurations. Specific shapes are left to the cable supplier, but must meet the insertion force and latch retention forces, defined in this Specification, when mated with and latched to the windows defined in the Fixed-side connectors, defined in this Specification.

See Figure 5-2 for the maximum allowable latch protrusion above the Fixed-side shell.

### 6.3.3 x4 Free External Cable Mechanical Performance

All bulk cable used for free external cable assemblies has the following attributes:

- Must meet external cable bend radius requirements for static bending listed in Table 6-6.
- Must comply with additional mechanical requirements listed in Section ## (*EDITORS NOTE: Point to “Performance Requirements for Connectors and Cables” section*).



**Figure 6-8. x4 Free External Cable Bend Radius**

**Table 6-6. x4 Free External Cable Bend Radius Requirements**

ID	Description	Dimension	Tolerance $\pm$
L01	Cable diameter	Supplier specific (by gage)	Supplier specific
L02	Inner bend radius	Supplier specific (by gage)	<b>Supplier specific</b>
L03	Face of connector housing to outside of cable bend	42.80	3.0

*[EDITORS NOTE: This section was previously Section 6.5.]*

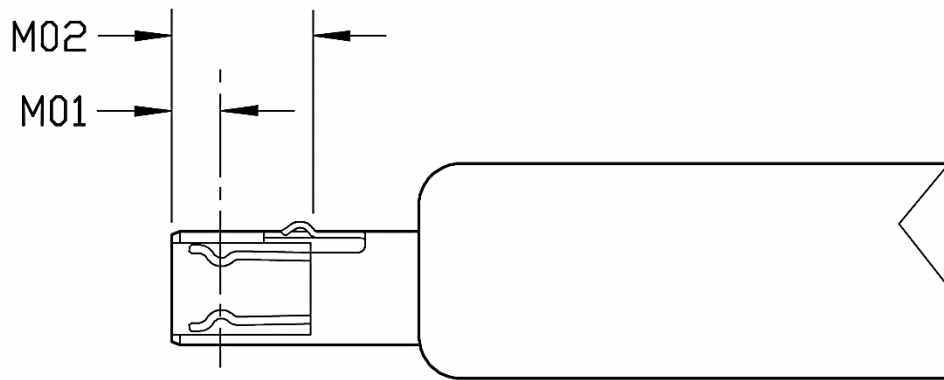
## 6.4 Latching for x4 Free Cable Assemblies

Figure 6-9 and Figure 6-10 illustrate requirements for passive and active latch types, respectively. Specific latch design is left to the cable supplier, but all latches and mated cable assemblies must meet the performance requirements defined in Section ## (*EDITORS NOTE: Point to “Performance Requirements for Connectors and Cables” section*).

See Figure 5-3 for the maximum latch protrusion allowable above the fixed host board-side shell.



### 6.6.1 Passive Latching for All x4 Free Cable Assemblies



**Figure 6-9. Passive Latching Dimensions for x4 Free Cable Assemblies**

**Table 6-7. Dimensions for the x4 Free Cable Passive Latch**

ID	Description	Dimension	Tolerance $\pm$
M01	Front of connector to contact point	1.19	0.11
M02	Front of connector to passive latch retention point	3.49	0.20

6.4.1 Passive Latching for x4 Free Cable Form Factors

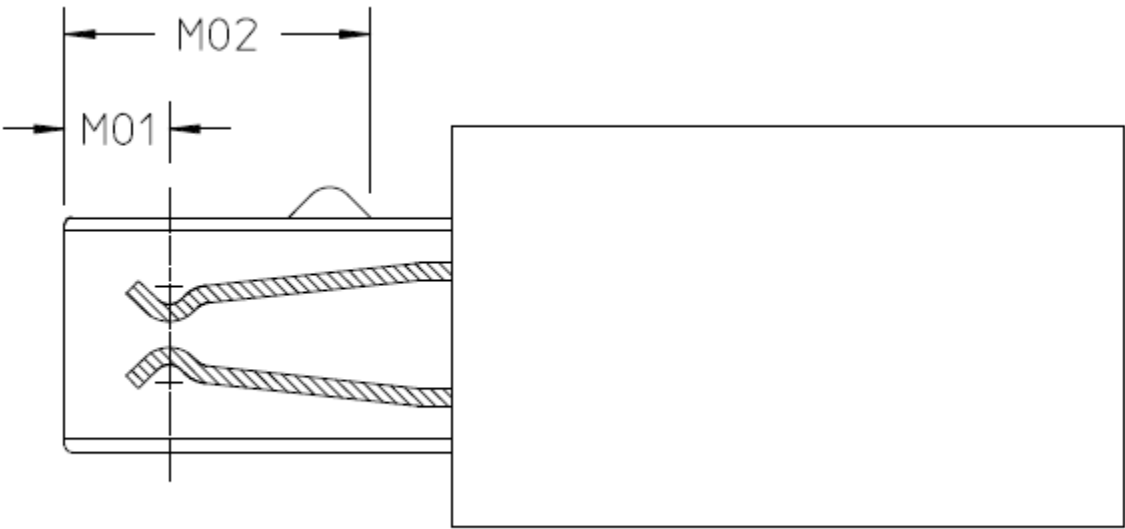
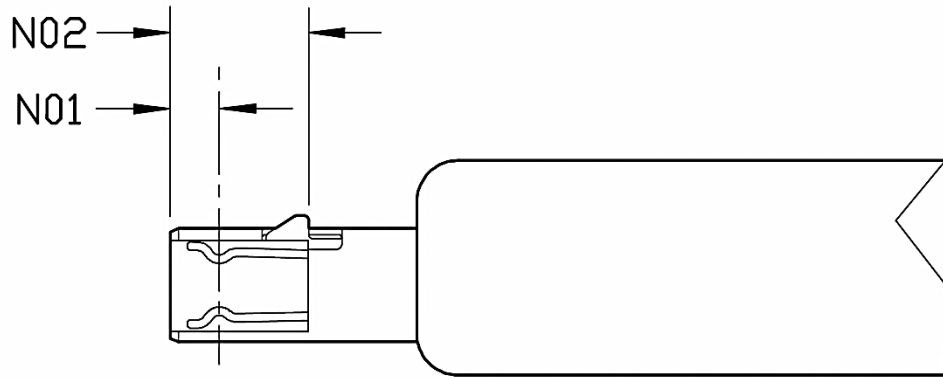


Figure 6-9. x4 Free Plug Passive Latch

Table 6-7. Dimensions for x4 Free Plug Passive Latch

ID	Description	Dimension	Tolerance ±
M01	Front of connector to <a href="#">terminal</a> contact point	1.14	0.10
M02	Front of connector to passive latch retention point	3.49	0.20

## 6.6.2 Active Latching for All x4 Free Cable Assemblies



**Figure 6-10. Active Latching Dimensions for x4 Free Cable Assemblies**

**Table 6-8. Dimensions for the x4 Free Active Cable Active Latch**

ID	Description	Dimension	Tolerance $\pm$
N01	Front of connector to contact point of terminal	1.19	0.11
N02	Front of connector to active latch retention point	3.34	0.14

6.4.2 Active Latching for x4 Free Cable Form Factors

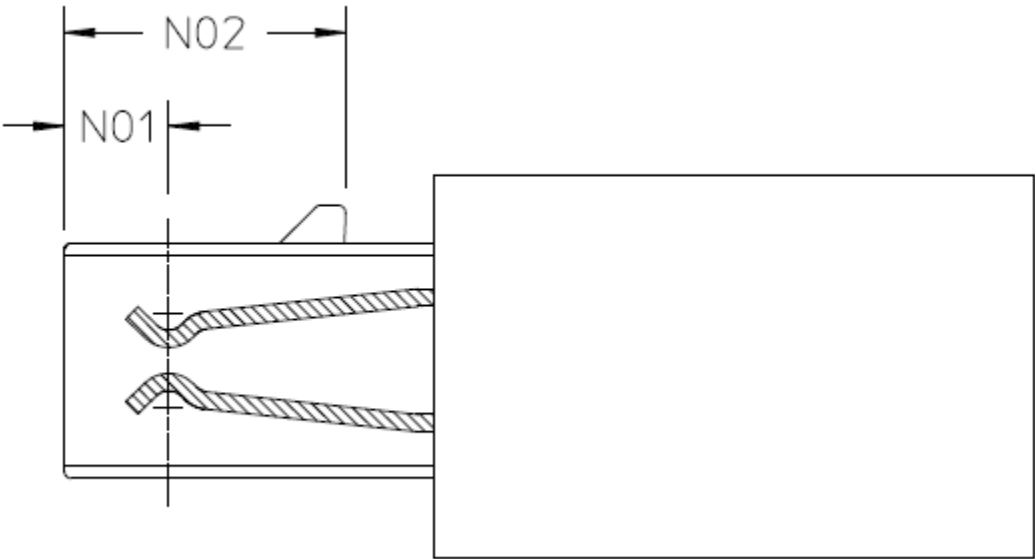


Figure 6-10. x4 Free Plug Active Latch

Table 6-8. Dimensions for x4 Free Plug Active Latch

ID	Description	Dimension	Tolerance $\pm$
N01	Front of connector to <a href="#">terminal</a> contact point <del> of terminal</del>	1.14	0.10
N02	Front of connector to active latch retention point	3.34	0.14

~~[EDITORS NOTE: Appendix containing dimensions for hold-down features and keep-out zones for footprints to be added in a separate ECR.]~~

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*EDITOR'S NOTE: New content begins here. No synonymous content in OCuLink 1.0 specification.*

## Appendix G - Informative Footprints

The OCUlink Specification does not dictate how fixed host board-side connectors are attached to PCBs. The following informative footprints are provided as reference to complement the normative footprint features provided in Section 4. Other hold-downs are permitted as long as the form factor dimensions listed in Sections 4.1 and 4.2 are satisfied and the performance requirements listed in Section ## *[EDITORS NOTE: Point to “Performance Requirements for Connectors and Cables” section.]* 6.9 are met.

### G.1. Example Footprints for Fixed Host Board-side Vertical Connectors

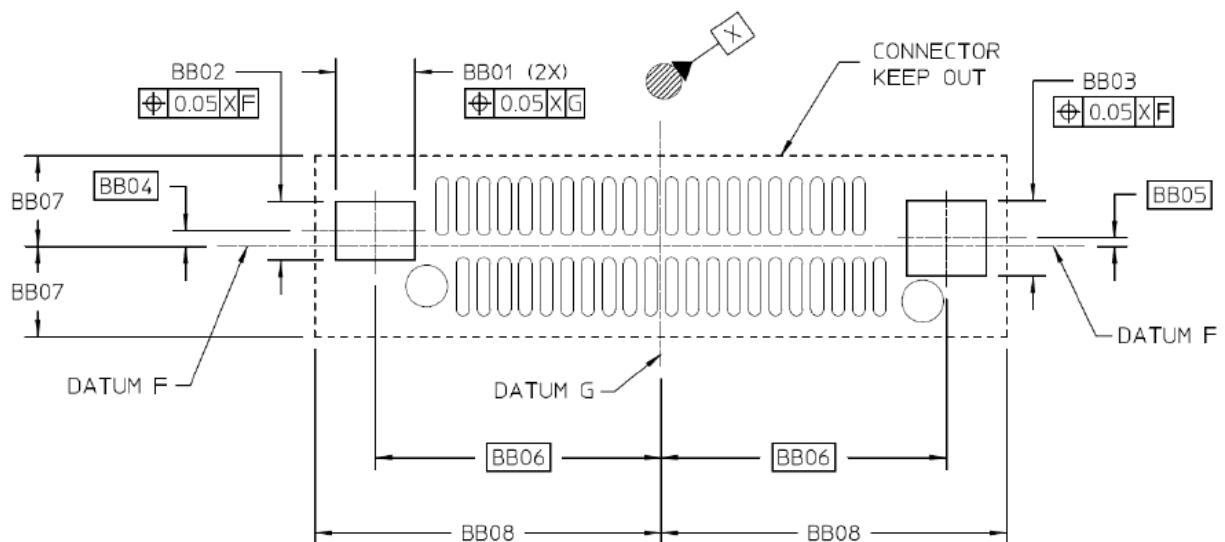
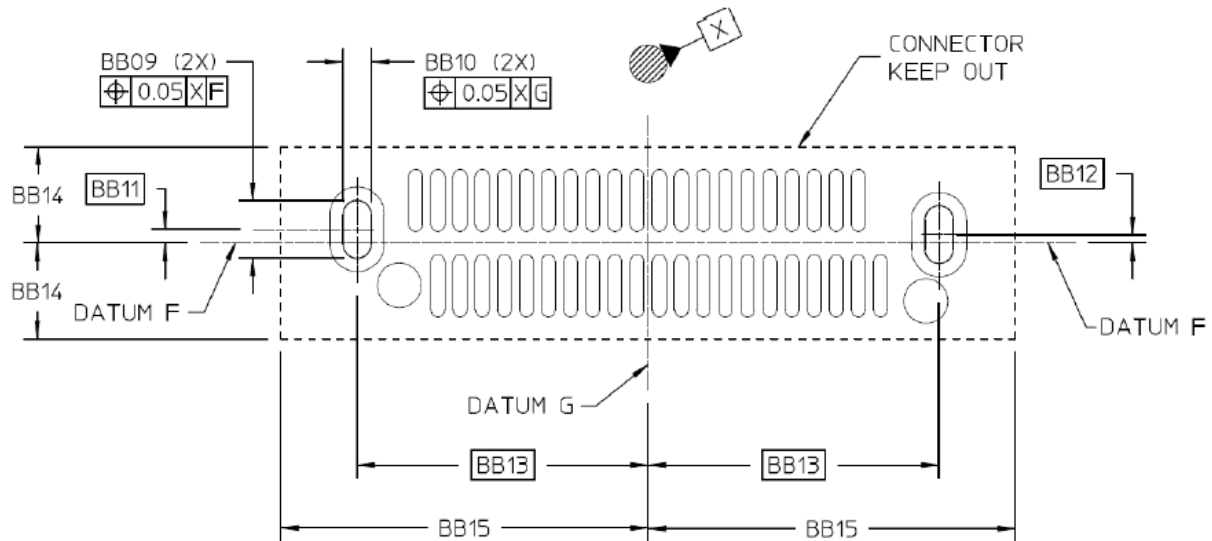


Figure G-1. Example SMT Footprint for Vertical Connectors

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*EDITOR'S NOTE: New content begins here. No synonymous content in OCuLink 1.0 specification.*

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**Figure G-2. Example Through-Hole Footprint for Vertical Connectors**



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*EDITOR'S NOTE: New content begins here. No synonymous content in OCuLink 1.0 specification.*

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**Table G-1. Dimensions for Example Footprints for Fixed Host Board-side Vertical Connectors**

ID	Description	Dimension	Tolerance $\pm$
<b>SMT Shell Hold-Downs</b>			
BB01	Width of shell solder pad (2X) <a href="#">(EDITOR'S NOTE: formerly B09)</a>	1.90	0.10
BB02	Height of left shell solder pad <a href="#">(EDITOR'S NOTE: formerly B08)</a>	1.40	0.10
BB03	Height of right shell solder pad <a href="#">(EDITOR'S NOTE: formerly B18)</a>	1.80	0.15
BB04	Horizontal CL of solder pad array (Datum F) to CL of left shell solder pad <a href="#">(EDITOR'S NOTE: formerly B07)</a>	0.37	Basic
BB05	Horizontal CL of solder pad array (Datum F) to CL of right shell solder pad <a href="#">(EDITOR'S NOTE: formerly B16)</a>	0.20	Basic
BB06	Vertical CL of solder pad array (Datum G) to CL of shell solder pad (2X) <a href="#">(EDITOR'S NOTE: formerly B01)</a>	6.85	Basic
BB07	Horizontal CL of solder pad array (Datum F) to edge of keep-out zone height <a href="#">(EDITOR'S NOTE: Dimension has been split over Datum F; formerly total height of keep-out [B06 = 4.32 +/- 0.15])</a>	<b>2.16</b>	<b>0.07</b>
BB08	Vertical CL of solder pad array (Datum G) to edge of keep-out zone width <a href="#">(EDITOR'S NOTE: Dimension has been split over Datum G; formerly total width of keep-out [B22 = 16.60 +/- 0.15])</a>	<b>8.30</b>	<b>0.07</b>
<b>Through-Hole Shell Hold-Downs</b>			
BB09	Length of shell through-hole (2X) <a href="#">(EDITOR'S NOTE: formerly B26)</a>	1.30	0.10
BB10	Width of shell through-hole (2X) <a href="#">(EDITOR'S NOTE: Dimensions hole width; hole was formerly round (B26 = 1.30 +/- 0.10))</a>	0.64	0.10
BB11	Horizontal CL of solder pad array (Datum F) to center of left shell through-hole <a href="#">(EDITOR'S NOTE: formerly B23)</a>	0.31	Basic
BB12	Horizontal CL of solder pad array (Datum F) to center of right shell through-hole <a href="#">(EDITOR'S NOTE: formerly B25)</a>	0.19	Basic
BB13	Vertical CL of solder pad array (Datum G) to center of shell through-hole <a href="#">(EDITOR'S NOTE: formerly B24)</a>	6.58	Basic
BB14	Horizontal CL of solder pad array (Datum F) to edge of keep-out zone height <a href="#">(EDITOR'S NOTE: Dimension has been split over Datum F; formerly total height of keep-out [ B06 = 4.32 +/- 0.15])</a>	<b>2.16</b>	<b>0.07</b>
BB15	Vertical CL of solder pad array (Datum G) to edge of keep-out zone width <a href="#">(EDITOR'S NOTE: Dimension has been split over Datum G; formerly total width of keep-out [B22 = 16.60 +/- 0.15])</a>	<b>8.30</b>	<b>0.07</b>

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*EDITOR'S NOTE: New content begins here. No synonymous content in OCuLink 1.0 specification.*

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## G.2. Fixed Host Board-side Right-angle Connector Example Footprints

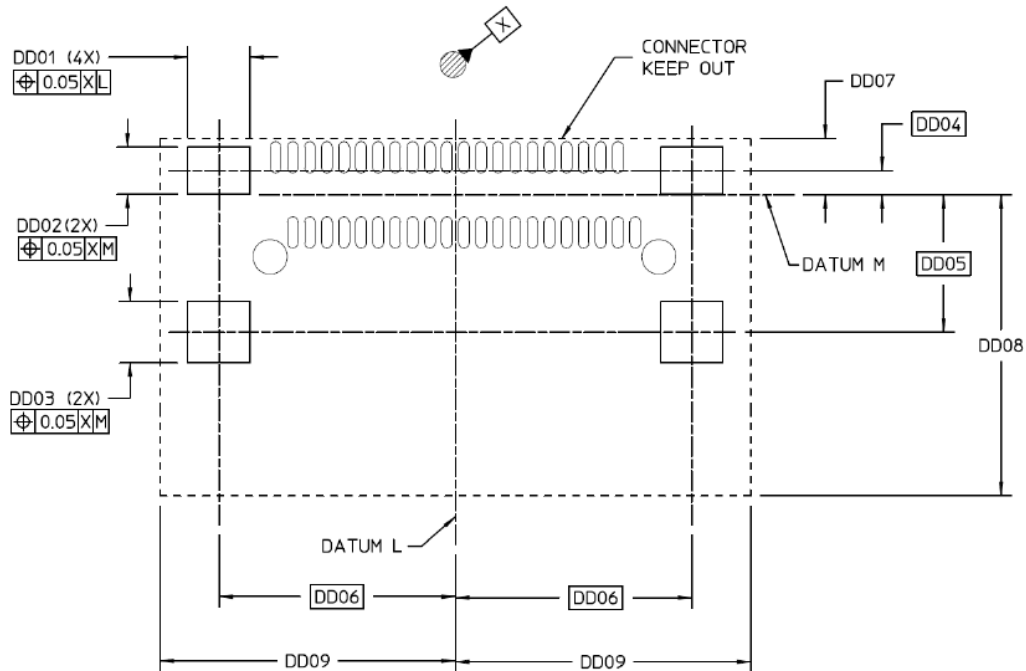


Figure G-3. Example SMT Footprint for Right-angle Connectors

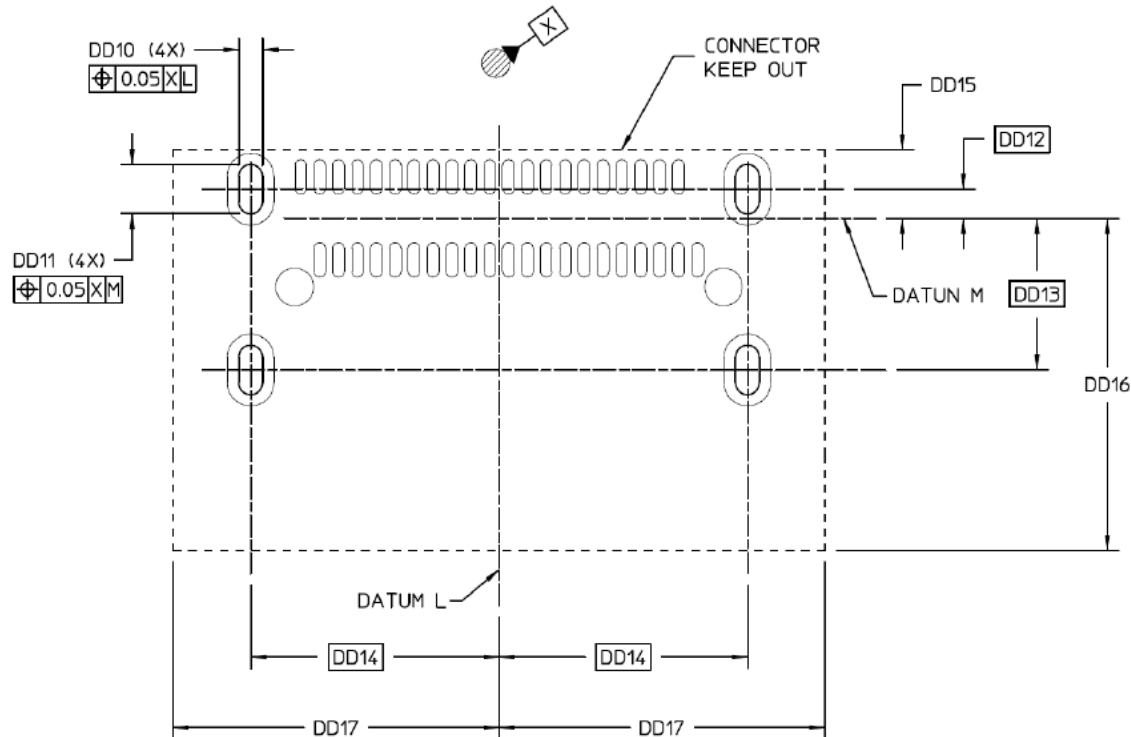


Figure G-4. Example Through-Hole Footprint for Right-angle Connectors

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*EDITOR'S NOTE: New content begins here. No synonymous content in OCuLink 1.0 specification.*

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**Table G-2. Dimensions for Example Footprints for Fixed Host Board-side Right-angle Connectors**

ID	Description	Dimension	Tolerance ±
<b>SMT Shell Hold-Downs</b>			
DD01	Width of shell solder pad (4X) <a href="#">(EDITOR'S NOTE: formerly D05)</a>	1.81	0.10
DD02	Height of small shell solder pad (2X) <a href="#">(EDITOR'S NOTE: formerly D06)</a>	1.38	0.10
DD03	Height of large shell solder pad (2X) <a href="#">(EDITOR'S NOTE: formerly D16)</a>	1.80	0.10
DD04	Horizontal CL of solder pad array (Datum M) to CL of small shell solder pad <a href="#">(EDITOR'S NOTE: formerly D09)</a>	0.71	<b>Basic</b>
DD05	Horizontal CL of solder pad array (Datum M) to CL of large shell solder pad <a href="#">(EDITOR'S NOTE: formerly D11)</a>	4.01	<b>Basic</b>
DD06	Vertical CL of solder pad array (Datum L) to CL of shell solder pad <a href="#">(EDITOR'S NOTE: formerly D01)</a>	6.91	0.05
DD07	Horizontal CL of solder pad array (Datum M) to back of keep-out zone height <a href="#">(EDITOR'S NOTE: Dimension references Datum M; formerly dimensioned from locating peg [D08 = 3.45 +/- 0.10])</a>	<b>1.64</b>	0.10
DD08	Horizontal CL of solder pad array (Datum M) to front of keep-out zone height <a href="#">(EDITOR'S NOTE: Dimension references Datum M; formerly dimensioned from locating peg [DD07 + DD08 = D12 (10.42 +/- 0.15)])</a>	<b>8.78</b>	0.10
DD09	Vertical CL of solder pad array (Datum L) to edge of keep-out zone width <a href="#">(EDITOR'S NOTE: Dimension has been split over Datum L; formerly total width of keep-out [D22 = 17.25 +/- 0.15])</a>	<b>8.63</b>	<b>0.07</b>
<b>Through-Hole Shell Hold-Downs</b> <a href="#">(EDITOR'S NOTE: OCuLink 1.0 did not include a thru hole footprint for the right-angle receptacle; all dimensions match footprint for right-angle SMT receptacle except where noted)</a>			
DD10	Width of shell through-hole (4X) <a href="#">(EDITOR'S NOTE: Added dimension)</a>	<b>0.64</b>	<b>0.10</b>
DD11	Length of shell through-hole (4X) <a href="#">(EDITOR'S NOTE: Added dimension)</a>	<b>1.30</b>	<b>0.10</b>
DD12	Horizontal CL of solder pad array (Datum M) to center of back shell through-holes	0.71	Basic
DD13	Horizontal CL of solder pad array (Datum M) to center of front shell through-holes	4.01	Basic
DD14	Vertical CL of solder pad array (Datum L) to CL of shell through-hole	6.91	0.05
DD15	Horizontal CL of solder pad array (Datum M) to back of keep-out zone height	1.64	0.10
DD16	Horizontal CL of solder pad array (Datum M) to front of keep-out zone height	8.78	0.10
DD17	Vertical CL of solder pad array (Datum L) to edge of keep-out zone width	8.63	0.07